```matlab
% Program to Calculate Electrical Component Values for Oscillator
System of Coil #1
syms t C1 C2 C3 L1 R1 Rs Rd Rl1 Vbias Vdd1 Vdd Vdds IDss Vss Vg I1
 I2 I3 I4 Xc1 Xc2 Xc3 Xl1 Gm f pi;
syms Amplitude;
syms Gm0 Vgs Vgoff;
syms M1 M2 B1 Result1 M3 M4 B2 Result2 sign1 sign2;
syms Fcx;
pi = 3.14159;
C1 = 0.000000000680*1000;
C2 = 0.000000000075*1000;
C3 = 0.000000000047*1000;
L1 = 0.0000013*1000;
R1 = 1000000*1000;
Rd = 6800*1000;
f = 1/(2*pi*(L1*C1*C2/(C1 + C2))^(1/2));
Rl1 = 2*pi*f*L1;
Vdd = 12*1000;
Vg = sin(2*pi*f);
Xc1 = 1/(2*pi*f*C1);
Xc2 = 1/(2*pi*f*C2);
Xc3 = 1/(2*pi*f*C3);
Xl1 = 2*pi*f*L1;
IDss = 0.003*1000;
Vgoff = 1.5*1000;
Gm0 = -2*IDss/Vgoff;
Vgs = -2*1000;
Gm = (Vgoff/(Gm0*Vgs)) + 1;
Rs = Rd - (1/Gm);
Vss = IDss*Rs;
Vdd1 = Gm*Rd*Vg;
Amplitude = 0.0039;
Vbias = 0.0039;
M1 = [(Xl1 + Xc1 + Xc2 + Rl1) (-1*Xc1) (-1*Xc2) (0.0);];
M1 = [M1; (-1*Xc1) (Xc1 + Rs) (-1*Rs) (0.0);];
M1 = [M1; (-1*Xc2) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M1 = [M1; (0.0) (0.0) (0.0) (R1 + Rd);];
B1 = [(Vg); (Vss); (-1*Vss + Vdds); (Vdd + Vbias);];
M2 = [B1(1) (-1*Xc1) (-1*Xc2) (0.0);];
M2 = [M2; B1(2) (Xc1 + Rs) (-1*Rs) (0.0);];
M2 = [M2; B1(3) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M2 = [M2; B1(4) (0.0) (0.0) (R1 + Rd);];
Result1 = abs(det(M2)/det(M1));
%
% Now, you want to design a circuit that has Fc times the freq. of
 circuit 1
% and Ac times the amp. of circuit 1
syms Fc Ac Ac1 Xc1a Xc2a Rsa;
```

```
Vg = Ac1*sin(2*pi*f*Fc);
% Xc2a is the reactance for the second capacitor adjusted for Fc a
nd Ac1
Fcx = ((2*2*pi*pi)/(Fc*Fc*f*f))*(C1*0.000000001 + C2*0.000000001)/
(C1*0.000000001*C2*0.000000001*L1);
Xc1a = 1/(2*pi*f*C1*0.000000001*Fcx);
Xc2a = 1/(2*pi*f*C2*0.000000001*Fcx);
Rsa = Rd*Ac1 - (1/Gm);
M3 = [(Xl1*Ac1 + Xc1a*Ac1 + Xc2a + Rl1*Ac1) (-1*Xc1a*Ac1) (-1*Xc2a
) (0.0);];
M3 = [M3; (-1*Xc1a*Ac1) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M3 = [M3; (-1*Xc2a) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M3 = [M3; (0.0) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
B2 = [(Vg*Ac1); (IDss*Rsa); (-1*(IDss*Rsa) + Vdds*Ac1); (Vdd*Ac1 +
 Vbias*Ac1);];
M4 = [B2(1) (-1*Xc1a*Ac1) (-1*Xc2a) (0.0);];
M4 = [M4; B2(2) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M4 = [M4; B2(3) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M4 = [M4; B2(4) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
Result2 = abs(det(M4)/det(M3));
sign1 = abs(det(M2)/det(M1))/(det(M2)/det(M1));
sign2 = abs(det(M4)/det(M3))/(det(M4)/det(M3));
cw2out1;
fid = fopen('f:/draw1/colpitts4w2.txt','w');
syms DesiredAmp DesiredAmp1 NewAmp NewAmp2 pAc1 Ac1x2 Closest Clos
estAc1 NAexp;
DesiredAmp = 2.564102564;
Fc = 1000000000/(16983891.6318);
Closest = 0.0;
ClosestAc1 = 0.0;
NAexp = abs(eval((Result2/sin(2*pi*f*Fc))/(Result1/sin(2*pi*f))));
for Ac1 = 1:1000,
  NewAmp = abs(eval(NAexp));
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = Ac1;
  end
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10;
  end
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      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
         Closest = NewAmp2;
      end
   end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
   Ac1 = pAc1 + Ac1x2/100;
   NewAmp2 = abs(eval(NAexp));
   if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/100;
   end
   if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
   end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
   Ac1 = pAc1 + Ac1x2/1000;
   NewAmp2 = abs(eval(NAexp));
   if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/1000;
   end
   if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
   end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
   Ac1 = pAc1 + Ac1x2/10000;
   NewAmp2 = abs(eval(NAexp));
   if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/10000;
   end
   if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
   end
end
fprintf(fid,';\n');
fprintf(fid,';Program colpitts4w2.m - (c) 2003 Leonard Gojer\n');
fprintf(fid,';Computation of Coil Component Parameters for Draw1\n
');
fprintf(fid,';\n');
fprintf(fid,';Initial Frequency and Amplitude Change To Set Up Dra
w1\n');
fprintf(fid,';from Colpitts example in textbook\n');
```

```
fprintf(fid,'\n');
fprintf(fid,';Desired Frequency                    = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification                = ');
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude           = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude         = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,'; (Component Amplification Factor)     = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,'; (Result 2/Result 1)                  = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,'(defun c:drawblks()');
fprintf(fid,'\n');
fprintf(fid,'  (progn');
fprintf(fid,'\n');
DesiredAmp1 = DesiredAmp;
syms sacm;
sacm = size(acm);
for i1 = 1:sacm
  DesiredAmp = acm(i1)*DesiredAmp1;
  Fc =   i1*1000000000/(16983891.6318);
  Closest = 0.0;
  for Ac1 = 1:1000,
    NewAmp = abs(eval(NAexp));
    if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = Ac1;
    end
    if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp;
    end
  end
  Ac1 = ClosestAc1;
  pAc1 = Ac1;
  for Ac1x2 = -5:5,
    Ac1 = pAc1 + Ac1x2/10;
    NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
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```
      ClosestAc1 = pAc1 + Ac1x2/10;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/100;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/100;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/1000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/1000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
fprintf(fid,';\n');
fprintf(fid,';Desired Frequency                  = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification              = ');
```

```
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude              = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude            = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,';(Component Amplification Factor)         = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,';(Result 2/Result 1)                      = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';Sign 1 (sign of Result 1)                = ');
fprintf(fid,'%35.16f',sign1);
fprintf(fid,'\n');
fprintf(fid,';Sign 2 (sign of Result 2)                = ');
fprintf(fid,'%35.16f',eval(sign2));
fprintf(fid,'\n');
fprintf(fid,';L1                                       = ');
fprintf(fid,'%35.16f',L1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';C1                                       = ');
fprintf(fid,'%35.16f',eval(C1*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C2                                       = ');
fprintf(fid,'%35.16f',eval(C2*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C3                                       = ');
fprintf(fid,'%35.16f',C3/Ac1);
fprintf(fid,'\n');
fprintf(fid,';Rd                                       = ');
fprintf(fid,'%35.16f',Rd*Ac1);
fprintf(fid,'\n');
fprintf(fid,';R1                                       = ');
fprintf(fid,'%35.16f',R1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';Rl1                                      = ');
fprintf(fid,'%35.16f',Rl1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,';\n');
fprintf(fid,'      (setq count ');
fprintf(fid,'%22.16f',i1);
fprintf(fid,')\n');
```

```
fprintf(fid,'      (setq DesFreq ');
fprintf(fid,'%22.16f',round(f*Fc));
fprintf(fid,')\n');
fprintf(fid,'      (setq DesAmp ');
fprintf(fid,'%22.16f',DesiredAmp);
fprintf(fid,')\n');
fprintf(fid,'      (setq Init1Amp ');
fprintf(fid,'%22.16f',Result1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Sec2Amp ');
fprintf(fid,'%22.16f',eval(Result2));
fprintf(fid,')\n');
fprintf(fid,'      (setq CompAc1 ');
fprintf(fid,'%22.16f',Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq CheckAmp ');
fprintf(fid,'%22.16f',eval(Result2/Result1));
fprintf(fid,')\n');
fprintf(fid,'      (setq Sign1 ');
fprintf(fid,'%22.16f',sign1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Sign2 ');
fprintf(fid,'%22.16f',eval(sign2));
fprintf(fid,')\n');
fprintf(fid,'      (setq L1 ');
fprintf(fid,'%22.16f',L1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq C1 ');
fprintf(fid,'%22.16f',eval(C1*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'      (setq C2 ');
fprintf(fid,'%22.16f',eval(C2*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'      (setq C3 ');
fprintf(fid,'%22.16f',C3/Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Rd ');
fprintf(fid,'%22.16f',Rd*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq R1 ');
fprintf(fid,'%22.16f',R1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Rl1 ');
fprintf(fid,'%22.16f',Rl1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (insblkd count DesFreq DesAmp Init1Amp Sec2Amp
CompAc1 CheckAmp Sign1 Sign2');
fprintf(fid,' L1 C1 C2 C3 Rd R1 Rl1)\n');
```

```
   fprintf(fid,';\n');
 end
fprintf(fid,'   )');
fprintf(fid,'\n');
fprintf(fid,')');
fprintf(fid,'\n');
fclose(fid);
```

```
% Program to Calculate Electrical Component Values for Oscillator
System of Coil #2
syms t C1 C2 C3 L1 R1 Rs Rd Rl1 Vbias Vdd1 Vdd Vdds IDss Vss Vg I1
 I2 I3 I4 Xc1 Xc2 Xc3 Xl1 Gm f pi;
syms Amplitude;
syms Gm0 Vgs Vgoff;
syms M1 M2 B1 Result1 M3 M4 B2 Result2 sign1 sign2;
syms Fcx;
pi = 3.14159;
C1 = 0.000000000680*1000;
C2 = 0.000000000075*1000;
C3 = 0.000000000047*1000;
L1 = 0.0000013*1000;
R1 = 1000000*1000;
Rd = 6800*1000;
f = 1/(2*pi*(L1*C1*C2/(C1 + C2))^(1/2));
Rl1 = 2*pi*f*L1;
Vdd = 12*1000;
Vg = sin(2*pi*f);
Xc1 = 1/(2*pi*f*C1);
Xc2 = 1/(2*pi*f*C2);
Xc3 = 1/(2*pi*f*C3);
Xl1 = 2*pi*f*L1;
IDss = 0.003*1000;
Vgoff = 1.5*1000;
Gm0 = -2*IDss/Vgoff;
Vgs = -2*1000;
Gm = (Vgoff/(Gm0*Vgs)) + 1;
Rs = Rd - (1/Gm);
Vss = IDss*Rs;
Vdd1 = Gm*Rd*Vg;
Amplitude = 0.0039;
Vbias = 0.0039;
M1 = [(Xl1 + Xc1 + Xc2 + Rl1) (-1*Xc1) (-1*Xc2) (0.0);];
M1 = [M1; (-1*Xc1) (Xc1 + Rs) (-1*Rs) (0.0);];
M1 = [M1; (-1*Xc2) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M1 = [M1; (0.0) (0.0) (0.0) (R1 + Rd);];
B1 = [(Vg); (Vss); (-1*Vss + Vdds); (Vdd + Vbias);];
M2 = [B1(1) (-1*Xc1) (-1*Xc2) (0.0);];
M2 = [M2; B1(2) (Xc1 + Rs) (-1*Rs) (0.0);];
M2 = [M2; B1(3) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M2 = [M2; B1(4) (0.0) (0.0) (R1 + Rd);];
Result1 = abs(det(M2)/det(M1));
%
% Now, you want to design a circuit that has Fc times the freq. of
 circuit 1
% and Ac times the amp. of circuit 1
syms Fc Ac Ac1 Xc1a Xc2a Rsa;
```

```
Vg = Ac1*sin(2*pi*f*Fc);
% Xc2a is the reactance for the second capacitor adjusted for Fc a
nd Ac1
Fcx = ((2*2*pi*pi)/(Fc*Fc*f*f))*(C1*0.000000001 + C2*0.000000001)/
(C1*0.000000001*C2*0.000000001*L1);
Xc1a = 1/(2*pi*f*C1*0.000000001*Fcx);
Xc2a = 1/(2*pi*f*C2*0.000000001*Fcx);
Rsa = Rd*Ac1 - (1/Gm);
M3 = [(Xl1*Ac1 + Xc1a*Ac1 + Xc2a + Rl1*Ac1) (-1*Xc1a*Ac1) (-1*Xc2a
) (0.0);];
M3 = [M3; (-1*Xc1a*Ac1) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M3 = [M3; (-1*Xc2a) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M3 = [M3; (0.0) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
B2 = [(Vg*Ac1); (IDss*Rsa); (-1*(IDss*Rsa) + Vdds*Ac1); (Vdd*Ac1 +
 Vbias*Ac1);];
M4 = [B2(1) (-1*Xc1a*Ac1) (-1*Xc2a) (0.0);];
M4 = [M4; B2(2) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M4 = [M4; B2(3) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M4 = [M4; B2(4) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
Result2 = abs(det(M4)/det(M3));
sign1 = abs(det(M2)/det(M1))/(det(M2)/det(M1));
sign2 = abs(det(M4)/det(M3))/(det(M4)/det(M3));
cw4out1;
fid = fopen('f:/draw1/colpitts4w4.txt','w');
syms DesiredAmp DesiredAmp1 NewAmp NewAmp2 pAc1 Ac1x2 Closest Clos
estAc1 NAexp;
DesiredAmp = 2.564102564;
Fc = 1000000000/(16983891.6318);
Closest = 0.0;
ClosestAc1 = 0.0;
NAexp = abs(eval((Result2/sin(2*pi*f*Fc))/(Result1/sin(2*pi*f))));
for Ac1 = 1:1000,
  NewAmp = abs(eval(NAexp));
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = Ac1;
  end
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10;
  end
```

```
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/100;
  NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/100;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/1000;
  NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/1000;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10000;
  NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/10000;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
fprintf(fid,';\n');
fprintf(fid,';Program colpitts4w4.m - (c) 2003 Leonard Gojer\n');
fprintf(fid,';Computation of Coil Component Parameters for Draw1\n');
fprintf(fid,';\n');
fprintf(fid,';Initial Frequency and Amplitude Change To Set Up Draw1\n');
fprintf(fid,';from Colpitts example in textbook\n');
```

```
fprintf(fid,'\n');
fprintf(fid,';Desired Frequency                          = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification                      = ');
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude                 = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude               = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,';(Component Amplification Factor)           = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,';(Result 2/Result 1)                        = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,'(defun c:drawblks()');
fprintf(fid,'\n');
fprintf(fid,'  (progn');
fprintf(fid,'\n');
DesiredAmp1 = DesiredAmp;
syms sacm;
sacm = size(acm);
for i1 = 1:sacm
  DesiredAmp = acm(i1)*DesiredAmp1;
  Fc =  i1*1000000000/(16983891.6318);
  Closest = 0.0;
  for Ac1 = 1:1000,
    NewAmp = abs(eval(NAexp));
    if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = Ac1;
    end
    if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp;
    end
  end
  Ac1 = ClosestAc1;
  pAc1 = Ac1;
  for Ac1x2 = -5:5,
    Ac1 = pAc1 + Ac1x2/10;
    NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
```

```
      ClosestAc1 = pAc1 + Ac1x2/10;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/100;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/100;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/1000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/1000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
fprintf(fid,';\n');
fprintf(fid,';Desired Frequency                  = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification              = ');
```

```
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude            = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude          = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,';(Component Amplification Factor)       = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,';(Result 2/Result 1)                    = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';Sign 1 (sign of Result 1)             = ');
fprintf(fid,'%35.16f',sign1);
fprintf(fid,'\n');
fprintf(fid,';Sign 2 (sign of Result 2)             = ');
fprintf(fid,'%35.16f',eval(sign2));
fprintf(fid,'\n');
fprintf(fid,';L1                                    = ');
fprintf(fid,'%35.16f',L1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';C1                                    = ');
fprintf(fid,'%35.16f',eval(C1*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C2                                    = ');
fprintf(fid,'%35.16f',eval(C2*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C3                                    = ');
fprintf(fid,'%35.16f',C3/Ac1);
fprintf(fid,'\n');
fprintf(fid,';Rd                                    = ');
fprintf(fid,'%35.16f',Rd*Ac1);
fprintf(fid,'\n');
fprintf(fid,';R1                                    = ');
fprintf(fid,'%35.16f',R1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';Rl1                                   = ');
fprintf(fid,'%35.16f',Rl1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,';\n');
fprintf(fid,'      (setq count ');
fprintf(fid,'%22.16f',i1);
fprintf(fid,')\n');
```

```
fprintf(fid,'     (setq DesFreq ');
fprintf(fid,'%22.16f',round(f*Fc));
fprintf(fid,')\n');
fprintf(fid,'     (setq DesAmp ');
fprintf(fid,'%22.16f',DesiredAmp);
fprintf(fid,')\n');
fprintf(fid,'     (setq Init1Amp ');
fprintf(fid,'%22.16f',Result1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Sec2Amp ');
fprintf(fid,'%22.16f',eval(Result2));
fprintf(fid,')\n');
fprintf(fid,'     (setq CompAc1 ');
fprintf(fid,'%22.16f',Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq CheckAmp ');
fprintf(fid,'%22.16f',eval(Result2/Result1));
fprintf(fid,')\n');
fprintf(fid,'     (setq Sign1 ');
fprintf(fid,'%22.16f',sign1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Sign2 ');
fprintf(fid,'%22.16f',eval(sign2));
fprintf(fid,')\n');
fprintf(fid,'     (setq L1 ');
fprintf(fid,'%22.16f',L1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq C1 ');
fprintf(fid,'%22.16f',eval(C1*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'     (setq C2 ');
fprintf(fid,'%22.16f',eval(C2*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'     (setq C3 ');
fprintf(fid,'%22.16f',C3/Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Rd ');
fprintf(fid,'%22.16f',Rd*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq R1 ');
fprintf(fid,'%22.16f',R1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Rl1 ');
fprintf(fid,'%22.16f',Rl1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (insblkd count DesFreq DesAmp Init1Amp Sec2Amp
CompAc1 CheckAmp Sign1 Sign2');
fprintf(fid,' L1 C1 C2 C3 Rd R1 Rl1)\n');
```

```
   fprintf(fid,';\n');
 end
fprintf(fid,'   )');
fprintf(fid,'\n');
fprintf(fid,')');
fprintf(fid,'\n');
fclose(fid);
```

```
% Program to Calculate Electrical Component Values for Oscillator
System of Coil #3
syms t C1 C2 C3 L1 R1 Rs Rd Rl1 Vbias Vdd1 Vdd Vdds IDss Vss Vg I1
 I2 I3 I4 Xc1 Xc2 Xc3 Xl1 Gm f pi;
syms Amplitude;
syms Gm0 Vgs Vgoff;
syms M1 M2 B1 Result1 M3 M4 B2 Result2 sign1 sign2;
syms Fcx;
pi = 3.14159;
C1 = 0.000000000680*1000;
C2 = 0.000000000075*1000;
C3 = 0.000000000047*1000;
L1 = 0.0000013*1000;
R1 = 1000000*1000;
Rd = 6800*1000;
f = 1/(2*pi*(L1*C1*C2/(C1 + C2))^(1/2));
Rl1 = 2*pi*f*L1;
Vdd = 12*1000;
Vg = sin(2*pi*f);
Xc1 = 1/(2*pi*f*C1);
Xc2 = 1/(2*pi*f*C2);
Xc3 = 1/(2*pi*f*C3);
Xl1 = 2*pi*f*L1;
IDss = 0.003*1000;
Vgoff = 1.5*1000;
Gm0 = -2*IDss/Vgoff;
Vgs = -2*1000;
Gm = (Vgoff/(Gm0*Vgs)) + 1;
Rs = Rd - (1/Gm);
Vss = IDss*Rs;
Vdd1 = Gm*Rd*Vg;
Amplitude = 0.0039;
Vbias = 0.0039;
M1 = [(Xl1 + Xc1 + Xc2 + Rl1) (-1*Xc1) (-1*Xc2) (0.0);];
M1 = [M1; (-1*Xc1) (Xc1 + Rs) (-1*Rs) (0.0);];
M1 = [M1; (-1*Xc2) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M1 = [M1; (0.0) (0.0) (0.0) (R1 + Rd);];
B1 = [(Vg); (Vss); (-1*Vss + Vdds); (Vdd + Vbias);];
M2 = [B1(1) (-1*Xc1) (-1*Xc2) (0.0);];
M2 = [M2; B1(2) (Xc1 + Rs) (-1*Rs) (0.0);];
M2 = [M2; B1(3) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M2 = [M2; B1(4) (0.0) (0.0) (R1 + Rd);];
Result1 = abs(det(M2)/det(M1));
%
% Now, you want to design a circuit that has Fc times the freq. of
 circuit 1
% and Ac times the amp. of circuit 1
syms Fc Ac Ac1 Xc1a Xc2a Rsa;
```

```
Vg = Ac1*sin(2*pi*f*Fc);
% Xc2a is the reactance for the second capacitor adjusted for Fc a
nd Ac1
Fcx = ((2*2*pi*pi)/(Fc*Fc*f*f))*(C1*0.000000001 + C2*0.000000001)/
(C1*0.000000001*C2*0.000000001*L1);
Xc1a = 1/(2*pi*f*C1*0.000000001*Fcx);
Xc2a = 1/(2*pi*f*C2*0.000000001*Fcx);
Rsa = Rd*Ac1 - (1/Gm);
M3 = [(Xl1*Ac1 + Xc1a*Ac1 + Xc2a + Rl1*Ac1) (-1*Xc1a*Ac1) (-1*Xc2a
) (0.0);];
M3 = [M3; (-1*Xc1a*Ac1) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M3 = [M3; (-1*Xc2a) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M3 = [M3; (0.0) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
B2 = [(Vg*Ac1); (IDss*Rsa); (-1*(IDss*Rsa) + Vdds*Ac1); (Vdd*Ac1 +
 Vbias*Ac1);];
M4 = [B2(1) (-1*Xc1a*Ac1) (-1*Xc2a) (0.0);];
M4 = [M4; B2(2) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M4 = [M4; B2(3) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M4 = [M4; B2(4) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
Result2 = abs(det(M4)/det(M3));
sign1 = abs(det(M2)/det(M1))/(det(M2)/det(M1));
sign2 = abs(det(M4)/det(M3))/(det(M4)/det(M3));
cw6out1;
fid = fopen('f:/draw1/colpitts4w6.txt','w');
syms DesiredAmp DesiredAmp1 NewAmp NewAmp2 pAc1 Ac1x2 Closest Clos
estAc1 NAexp;
DesiredAmp = 2.564102564;
Fc = 1000000000/(16983891.6318);
Closest = 0.0;
ClosestAc1 = 0.0;
NAexp = abs(eval((Result2/sin(2*pi*f*Fc))/(Result1/sin(2*pi*f))));
for Ac1 = 1:1000,
  NewAmp = abs(eval(NAexp));
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = Ac1;
  end
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10;
  end
```

```
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/100;
  NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/100;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/1000;
  NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/1000;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10000;
  NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = pAc1 + Ac1x2/10000;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
fprintf(fid,';\n');
fprintf(fid,';Program colpitts4w6.m - (c) 2003 Leonard Gojer\n');
fprintf(fid,';Computation of Coil Component Parameters for Draw1\n
');
fprintf(fid,';\n');
fprintf(fid,';Initial Frequency and Amplitude Change To Set Up Dra
w1\n');
fprintf(fid,';from Colpitts example in textbook\n');
```

```
fprintf(fid,'\n');
fprintf(fid,';Desired Frequency                        = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification                    = ');
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude               = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude             = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,';(Component Amplification Factor)         = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,';(Result 2/Result 1)                      = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,'(defun c:drawblks()');
fprintf(fid,'\n');
fprintf(fid,'  (progn');
fprintf(fid,'\n');
DesiredAmp1 = DesiredAmp;
syms sacm;
sacm = size(acm);
for i1 = 1:sacm
   DesiredAmp = acm(i1)*DesiredAmp1;
   Fc =  i1*1000000000/(16983891.6318);
   Closest = 0.0;
   for Ac1 = 1:1000,
     NewAmp = abs(eval(NAexp));
     if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
       ClosestAc1 = Ac1;
     end
     if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
       Closest = NewAmp;
     end
   end
   Ac1 = ClosestAc1;
   pAc1 = Ac1;
   for Ac1x2 = -5:5,
     Ac1 = pAc1 + Ac1x2/10;
     NewAmp2 = abs(eval(NAexp));
     if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
```

```
        ClosestAc1 = pAc1 + Ac1x2/10;
      end
      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
        Closest = NewAmp2;
      end
    end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
      Ac1 = pAc1 + Ac1x2/100;
      NewAmp2 = abs(eval(NAexp));
      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
        ClosestAc1 = pAc1 + Ac1x2/100;
      end
      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
        Closest = NewAmp2;
      end
    end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
      Ac1 = pAc1 + Ac1x2/1000;
      NewAmp2 = abs(eval(NAexp));
      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
        ClosestAc1 = pAc1 + Ac1x2/1000;
      end
      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
        Closest = NewAmp2;
      end
    end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
      Ac1 = pAc1 + Ac1x2/10000;
      NewAmp2 = abs(eval(NAexp));
      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
        ClosestAc1 = pAc1 + Ac1x2/10000;
      end
      if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
        Closest = NewAmp2;
      end
    end
Ac1 = ClosestAc1;
fprintf(fid,';\n');
fprintf(fid,';Desired Frequency                    = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification                = ');
```

```
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude               = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude             = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,';(Component Amplification Factor)         = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,';(Result 2/Result 1)                      = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';Sign 1 (sign of Result 1)                = ');
fprintf(fid,'%35.16f',sign1);
fprintf(fid,'\n');
fprintf(fid,';Sign 2 (sign of Result 2)                = ');
fprintf(fid,'%35.16f',eval(sign2));
fprintf(fid,'\n');
fprintf(fid,';L1                                       = ');
fprintf(fid,'%35.16f',L1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';C1                                       = ');
fprintf(fid,'%35.16f',eval(C1*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C2                                       = ');
fprintf(fid,'%35.16f',eval(C2*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C3                                       = ');
fprintf(fid,'%35.16f',C3/Ac1);
fprintf(fid,'\n');
fprintf(fid,';Rd                                       = ');
fprintf(fid,'%35.16f',Rd*Ac1);
fprintf(fid,'\n');
fprintf(fid,';R1                                       = ');
fprintf(fid,'%35.16f',R1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';R11                                      = ');
fprintf(fid,'%35.16f',R11*Ac1);
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,';\n');
fprintf(fid,'     (setq count ');
fprintf(fid,'%22.16f',i1);
fprintf(fid,')\n');
```

```
fprintf(fid,'      (setq DesFreq ');
fprintf(fid,'%22.16f',round(f*Fc));
fprintf(fid,')\n');
fprintf(fid,'      (setq DesAmp ');
fprintf(fid,'%22.16f',DesiredAmp);
fprintf(fid,')\n');
fprintf(fid,'      (setq Init1Amp ');
fprintf(fid,'%22.16f',Result1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Sec2Amp ');
fprintf(fid,'%22.16f',eval(Result2));
fprintf(fid,')\n');
fprintf(fid,'      (setq CompAc1 ');
fprintf(fid,'%22.16f',Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq CheckAmp ');
fprintf(fid,'%22.16f',eval(Result2/Result1));
fprintf(fid,')\n');
fprintf(fid,'      (setq Sign1 ');
fprintf(fid,'%22.16f',sign1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Sign2 ');
fprintf(fid,'%22.16f',eval(sign2));
fprintf(fid,')\n');
fprintf(fid,'      (setq L1 ');
fprintf(fid,'%22.16f',L1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      -(setq C1 ');
fprintf(fid,'%22.16f',eval(C1*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'      -(setq C2 ');
fprintf(fid,'%22.16f',eval(C2*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'      (setq C3 ');
fprintf(fid,'%22.16f',C3/Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Rd ');
fprintf(fid,'%22.16f',Rd*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq R1 ');
fprintf(fid,'%22.16f',R1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (setq Rl1 ');
fprintf(fid,'%22.16f',Rl1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'      (insblkd count DesFreq DesAmp Init1Amp Sec2Amp
CompAc1 CheckAmp Sign1 Sign2');
fprintf(fid,' L1 C1 C2 C3 Rd R1 Rl1)\n');
```

```
   fprintf(fid,';\n');
 end
fprintf(fid,'   )');
fprintf(fid,'\n');
fprintf(fid,')');
fprintf(fid,'\n');
fclose(fid);
```

```
% Program to Calculate Electrical Component Values for Oscillator
System of Coil #4
syms t C1 C2 C3 L1 R1 Rs Rd Rl1 Vbias Vdd1 Vdd Vdds IDss Vss Vg I1
 I2 I3 I4 Xc1 Xc2 Xc3 Xl1 Gm f pi;
syms Amplitude;
syms Gm0 Vgs Vgoff;
syms M1 M2 B1 Result1 M3 M4 B2 Result2 sign1 sign2;
syms Fcx;
pi = 3.14159;
C1 = 0.000000000680*1000;
C2 = 0.000000000075*1000;
C3 = 0.000000000047*1000;
L1 = 0.0000013*1000;
R1 = 1000000*1000;
Rd = 6800*1000;
f = 1/(2*pi*(L1*C1*C2/(C1 + C2))^(1/2));
Rl1 = 2*pi*f*L1;
Vdd = 12*1000;
Vg = sin(2*pi*f);
Xc1 = 1/(2*pi*f*C1);
Xc2 = 1/(2*pi*f*C2);
Xc3 = 1/(2*pi*f*C3);
Xl1 = 2*pi*f*L1;
IDss = 0.003*1000;
Vgoff = 1.5*1000;
Gm0 = -2*IDss/Vgoff;
Vgs = -2*1000;
Gm = (Vgoff/(Gm0*Vgs)) + 1;
Rs = Rd - (1/Gm);
Vss = IDss*Rs;
Vdd1 = Gm*Rd*Vg;
Amplitude = 0.0039;
Vbias = 0.0039;
M1 = [(Xl1 + Xc1 + Xc2 + Rl1) (-1*Xc1) (-1*Xc2) (0.0);];
M1 = [M1; (-1*Xc1) (Xc1 + Rs) (-1*Rs) (0.0);];
M1 = [M1; (-1*Xc2) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M1 = [M1; (0.0) (0.0) (0.0) (R1 + Rd);];
B1 = [(Vg); (Vss); (-1*Vss + Vdds); (Vdd + Vbias);];
M2 = [B1(1) (-1*Xc1) (-1*Xc2) (0.0);];
M2 = [M2; B1(2) (Xc1 + Rs) (-1*Rs) (0.0);];
M2 = [M2; B1(3) (-1*Rs) (Xc2 + Rs + Xc3) (0.0);];
M2 = [M2; B1(4) (0.0) (0.0) (R1 + Rd);];
Result1 = abs(det(M2)/det(M1));
%
% Now, you want to design a circuit that has Fc times the freq. of
 circuit 1
% and Ac times the amp. of circuit 1
syms Fc Ac Ac1 Xc1a Xc2a Rsa;
```

```
Vg = Ac1*sin(2*pi*f*Fc);
% Xc2a is the reactance for the second capacitor adjusted for Fc a
nd Ac1
Fcx = ((2*2*pi*pi)/(Fc*Fc*f*f))*(C1*0.000000001 + C2*0.000000001)/
(C1*0.000000001*C2*0.000000001*L1);
Xc1a = 1/(2*pi*f*C1*0.000000001*Fcx);
Xc2a = 1/(2*pi*f*C2*0.000000001*Fcx);
Rsa = Rd*Ac1 - (1/Gm);
M3 = [(X11*Ac1 + Xc1a*Ac1 + Xc2a + R11*Ac1) (-1*Xc1a*Ac1) (-1*Xc2a
) (0.0);];
M3 = [M3; (-1*Xc1a*Ac1) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M3 = [M3; (-1*Xc2a) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M3 = [M3; (0.0) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
B2 = [(Vg*Ac1); (IDss*Rsa); (-1*(IDss*Rsa) + Vdds*Ac1); (Vdd*Ac1 +
 Vbias*Ac1);];
M4 = [B2(1) (-1*Xc1a*Ac1) (-1*Xc2a) (0.0);];
M4 = [M4; B2(2) (Xc1a*Ac1 + Rsa) (-1*Rsa) (0.0);];
M4 = [M4; B2(3) (-1*Rsa) (Xc2a + Rsa + Xc3*Ac1) (0.0);];
M4 = [M4; B2(4) (0.0) (0.0) (R1*Ac1 + Rd*Ac1);];
Result2 = abs(det(M4)/det(M3));
sign1 = abs(det(M2)/det(M1))/(det(M2)/det(M1));
sign2 = abs(det(M4)/det(M3))/(det(M4)/det(M3));
cw8out1;
fid = fopen('f:/draw1/colpitts4w8.txt','w');
syms DesiredAmp DesiredAmp1 NewAmp NewAmp2 pAc1 Ac1x2 Closest Clos
estAc1 NAexp;
DesiredAmp = 2.564102564;
Fc = 1000000000/(16983891.6318);
Closest = 0.0;
ClosestAc1 = 0.0;
NAexp = abs(eval((Result2/sin(2*pi*f*Fc))/(Result1/sin(2*pi*f))));
for Ac1 = 1:1000,
  NewAmp = abs(eval(NAexp));
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = Ac1;
  end
  if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10;
  end
```

```
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/100;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/100;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/1000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/1000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
fprintf(fid,';\n');
fprintf(fid,';Program colpitts4w8.m - (c) 2003 Leonard Gojer\n');
fprintf(fid,';Computation of Coil Component Parameters for Draw1\n');
fprintf(fid,';\n');
fprintf(fid,';Initial Frequency and Amplitude Change To Set Up Draw1\n');
fprintf(fid,';from Colpitts example in textbook\n');
```

```
fprintf(fid,'\n');
fprintf(fid,';Desired Frequency                        = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification                    = ');
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude               = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude             = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,';(Component Amplification Factor)         = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,';(Result 2/Result 1)                      = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,'(defun c:drawblks()');
fprintf(fid,'\n');
fprintf(fid,'  (progn');
fprintf(fid,'\n');
DesiredAmp1 = DesiredAmp;
syms sacm;
sacm = size(acm);
for i1 = 1:sacm
  DesiredAmp = acm(i1)*DesiredAmp1;
  Fc =  i1*1000000000/(16983891.6318);
  Closest = 0.0;
  for Ac1 = 1:1000,
    NewAmp = abs(eval(NAexp));
    if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
      ClosestAc1 = Ac1;
    end
    if abs(NewAmp - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp;
    end
  end
  Ac1 = ClosestAc1;
  pAc1 = Ac1;
  for Ac1x2 = -5:5,
    Ac1 = pAc1 + Ac1x2/10;
    NewAmp2 = abs(eval(NAexp));
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
```

```
      ClosestAc1 = pAc1 + Ac1x2/10;
    end
    if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
      Closest = NewAmp2;
    end
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/100;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/100;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/1000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/1000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
pAc1 = Ac1;
for Ac1x2 = -5:5,
  Ac1 = pAc1 + Ac1x2/10000;
  NewAmp2 = abs(eval(NAexp));
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    ClosestAc1 = pAc1 + Ac1x2/10000;
  end
  if abs(NewAmp2 - DesiredAmp) < abs(Closest - DesiredAmp)
    Closest = NewAmp2;
  end
end
Ac1 = ClosestAc1;
fprintf(fid,';\n');
fprintf(fid,';Desired Frequency                  = ');
fprintf(fid,'%35.16f',round(f*Fc));
fprintf(fid,'\n');
fprintf(fid,';Desired Amplification              = ');
```

```
fprintf(fid,'%35.16f',DesiredAmp);
fprintf(fid,'\n');
fprintf(fid,';Initial Result 1 Amplitude            = ');
fprintf(fid,'%35.16f',Result1);
fprintf(fid,'\n');
fprintf(fid,';Secondary Result 2 Amplitude          = ');
fprintf(fid,'%35.16f',eval(Result2));
fprintf(fid,'\n');
fprintf(fid,';Computed Ac1\n');
fprintf(fid,';(Component Amplification Factor)       = ');
fprintf(fid,'%35.16f',Ac1);
fprintf(fid,'\n');
fprintf(fid,';Check of Amplification Factor Desired\n');
fprintf(fid,';(Result 2/Result 1)                    = ');
fprintf(fid,'%35.16f',eval(Result2/Result1));
fprintf(fid,'\n');
fprintf(fid,';Sign 1 (sign of Result 1)              = ');
fprintf(fid,'%35.16f',sign1);
fprintf(fid,'\n');
fprintf(fid,';Sign 2 (sign of Result 2)              = ');
fprintf(fid,'%35.16f',eval(sign2));
fprintf(fid,'\n');
fprintf(fid,';L1                                     = ');
fprintf(fid,'%35.16f',L1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';C1                                     = ');
fprintf(fid,'%35.16f',eval(C1*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C2                                     = ');
fprintf(fid,'%35.16f',eval(C2*Fcx/Ac1));
fprintf(fid,'\n');
fprintf(fid,';C3                                     = ');
fprintf(fid,'%35.16f',C3/Ac1);
fprintf(fid,'\n');
fprintf(fid,';Rd                                     = ');
fprintf(fid,'%35.16f',Rd*Ac1);
fprintf(fid,'\n');
fprintf(fid,';R1                                     = ');
fprintf(fid,'%35.16f',R1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';Rl1                                    = ');
fprintf(fid,'%35.16f',Rl1*Ac1);
fprintf(fid,'\n');
fprintf(fid,';\n');
fprintf(fid,';\n');
fprintf(fid,'     (setq count ');
fprintf(fid,'%22.16f',i1);
fprintf(fid,')\n');
```

```
fprintf(fid,'     (setq DesFreq ');
fprintf(fid,'%22.16f',round(f*Fc));
fprintf(fid,')\n');
fprintf(fid,'     (setq DesAmp ');
fprintf(fid,'%22.16f',DesiredAmp);
fprintf(fid,')\n');
fprintf(fid,'     (setq Init1Amp ');
fprintf(fid,'%22.16f',Result1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Sec2Amp ');
fprintf(fid,'%22.16f',eval(Result2));
fprintf(fid,')\n');
fprintf(fid,'     (setq CompAc1 ');
fprintf(fid,'%22.16f',Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq CheckAmp ');
fprintf(fid,'%22.16f',eval(Result2/Result1));
fprintf(fid,')\n');
fprintf(fid,'     (setq Sign1 ');
fprintf(fid,'%22.16f',sign1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Sign2 ');
fprintf(fid,'%22.16f',eval(sign2));
fprintf(fid,')\n');
fprintf(fid,'     (setq L1 ');
fprintf(fid,'%22.16f',L1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq C1 ');
fprintf(fid,'%22.16f',eval(C1*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'     (setq C2 ');
fprintf(fid,'%22.16f',eval(C2*Fcx/Ac1));
fprintf(fid,')\n');
fprintf(fid,'     (setq C3 ');
fprintf(fid,'%22.16f',C3/Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Rd ');
fprintf(fid,'%22.16f',Rd*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq R1 ');
fprintf(fid,'%22.16f',R1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (setq Rl1 ');
fprintf(fid,'%22.16f',Rl1*Ac1);
fprintf(fid,')\n');
fprintf(fid,'     (insblkd count DesFreq DesAmp Init1Amp Sec2Amp
CompAc1 CheckAmp Sign1 Sign2');
fprintf(fid,' L1 C1 C2 C3 Rd R1 Rl1)\n');
```

```
    fprintf(fid,';\n');
  end
fprintf(fid,'   )');
fprintf(fid,'\n');
fprintf(fid,')');
fprintf(fid,'\n');
fclose(fid);
```

```
%----------------------------------------------------------------------
------------------
%coilwave4.m - Program to Compute Amplitude Values for Oscillators of Coil #4 of
Magnetic Bottle
%           - Waveform is Specified by Interpolation of 200 term fourier series in
Matlab
%----------------------------------------------------------------------
------------------
syms ax ay bx by cx cy dx dy ex ey fx fy;
syms gx gy hx hy ix iy jx jy kx ky lx ly;
syms mx my nx ny ox oy xof xofa yof yof2 m1 m2 dx1 dx1dy1 xvar yvar;
syms a1 b1 c1 f1 a2 b2 c2 a3 b3 c3 sum11 sum12 term1 term2;
syms a4 b4 c4 a1a b1a c1a f1a a1b b1b c1b expr1 expr2 pi;
syms a1c b1c c1c f1b f1c f2a f2b a1q b1q c1q fq asubn bsubn;
syms L k f3a f3b f4a f4b f4c x i1 i2 k1 loops iii1 foura fourb;
pi = 3.141592654;
L = 10;
k = 2;
k1 = 0.25;
m1 = 2.5;
m2 = -0.5;
ax = 0;
bx = k - k1 + ax;
cx = k + k1 + ax;
dx = L - k - k1 + ax;
ex = L - k + k1 + ax;
fx = L + k - k1 + ax;
gx = L + k + k1 + ax;
hx = 3*L - gx;
ix = 3*L - fx;
jx = 2*L;
kx = k + ax;
lx = 2*L - k + ax;
mx = L - k + ax;
nx = L + k + ax;
ox = 2*L - k;
ay = 0;
by = m1*(k - k1) + ay;
cy = m2*(k1) + m1*k + ay;
dy = m2*(L - 2*k - k1) + m1*k + ay;
ey = m2*(L - k + k1) + m1*k + ay;
fy = m2*(L + k - k1) + m1*k + ay;
gy = m2*(k + k1) + ay;
hy = gy;
iy = fy;
jy = 0;
ky = m1*k + ay;
ly = -m1*k + ay;
my = m2*(L - 2*k) + m1*k + ay;
ny = -1*(dy+ey)/2;
oy = -my;

fid = fopen('g:/draw1/coilwave4.out','w');
fprintf(fid,'Fourier Series of Coil #4 WaveForm');
fprintf(fid,'\n');
fprintf(fid,'----------------------------------');
fprintf(fid,'\n');
fprintf(fid,'\n');
dx1 = 2*L/1000;
for ii1 = 0:100
   sum11 = 0.0;
   sum12 = 0.0;
   for iii1 = 1:500
```

```
    xofa = iii1*2*L/1000;
    xof = (L/2) + xofa;
%------------------------------------------------------------------------
------------------
%f1

%2a1*bx + b1 = m1

%2a1*cx + b1 = m2

%c1 = -a1*bx^2 - b1*bx

%------------------------------------------------------------------------
------------------
    a1 = (m1 - m2)/(2*bx - 2*cx);
    b1 = (2*bx*m2 - 2*cx*m1)/(2*bx - 2*cx);
    c1 = (-1*a1)*bx*bx - b1*bx;
    f1 = a1*xof*xof + b1*xof + c1;

%------------------------------------------------------------------------
------------------
%f1a

%is f1 flipped

%------------------------------------------------------------------------
------------------
    f1a = a1*(L - xof)*(L - xof) + b1*(L - xof) + c1;

%------------------------------------------------------------------------
------------------
%f2a

%dy+f1a

%------------------------------------------------------------------------
------------------
    f2a = f1a + dy;

%------------------------------------------------------------------------
------------------
%f2b

%my+f1a

%------------------------------------------------------------------------
------------------
    f2b = f1a + my;

%------------------------------------------------------------------------
------------------
%f1b

%-f1 of (xof + L)

%------------------------------------------------------------------------
------------------
    a1b = (-m1 + m2)/(2*fx - 2*gx);
    b1b = (2*fx*(-m2) - 2*gx*(-m1))/(2*fx - 2*gx);
    c1b = (-1*a1b)*fx*fx - b1b*fx;
    f1b = a1b*xof*xof + b1b*xof + c1b;
    a1c = (m1 - m2)/(2*hx - 2*ix);
    b1c = (2*hx*(m2) - 2*ix*(m1))/(2*hx - 2*ix);
```

```
    c1c = (-1*a1c)*hx*hx - b1c*hx;

%-----------------------------------------------------------------------
--------------------
%f3a

%fy-f1b

%-----------------------------------------------------------------------
--------------------
    f3a = fy - f1b;

%-----------------------------------------------------------------------
--------------------
%f3b

%ny-f1b

%-----------------------------------------------------------------------
--------------------
    f3b = ny - f1b;

%-----------------------------------------------------------------------
--------------------
%f4c

%-f1a at 2nd point

%-----------------------------------------------------------------------
--------------------
    f4c = -a1c*(xof)*(xof) - b1c*(xof) - c1c;

%-----------------------------------------------------------------------
--------------------
%f4a

%-cy + f4c

%-----------------------------------------------------------------------
--------------------
    f4a = -f4c - cy;

%-----------------------------------------------------------------------
--------------------
%f4b

%f4c -cy

%-----------------------------------------------------------------------
--------------------
    f4b = -f4c - cy;

%-----------------------------------------------------------------------
--------------------
%returns

%x,y for x,cycle #

%-----------------------------------------------------------------------
--------------------
    if (xof < bx)
      yof = ay + m1*xof;
```

```
end
if (xof >= bx)
   if (xof < cx)
     yof = by + a1*xof*xof + b1*xof + c1;
   end
end
if (xof >= cx)
   if (xof < dx)
     yof = cy + m2*(xof - cx);
   end
end
if (xof >= dx)
   if (xof < (L - k))
     yof = f2a;
   end
end
if (xof >= (L - k))
   if (xof < ex)
     yof = f2b;
   end
end
if (xof >= ex)
   if (xof < fx)
     yof = ey + m2*(xof - ex);
   end
end
if (xof >= fx)
   if (xof < (L + k))
     yof = f3a;
   end
end
if (xof >= (L + k))
   if (xof < gx)
     yof = f3b;
   end
end
if (xof >= gx)
   if (xof < hx)
     yof = gy + m2*(xof - gx);
   end
end
if (xof >= hx)
   if (xof < ox)
     yof = f4a;
   end
end
if (xof >= ox)
   if (xof < ix)
     yof = f4b;
   end
end
if (xof >= ix)
   if (xof < jx)
     yof = -by + m1*(xof - ix);
   end
end
if (xof == jx)
   yof = 0.0;
end
term1 = cos(pi*ii1*xof/L);
term2 = sin(pi*ii1*xof/L);
yof2 = -1*yof;
dx1dy1 = dx1*yof2;
```

```
      expr1 = term1*dx1dy1;
      expr2 = term2*dx1dy1;
      sum11 = sum11 + expr1;
      sum12 = sum12 + expr2;
    end
    for iii1 = 501:1000
      xofa = iii1*2*L/1000;
      xof = xofa + (L/2);
```
%--

%f1

%2a1*bx + b1 = m1

%2a1*cx + b1 = m2

%c1 = -a1*bx^2 - b1*bx

%--

```
    a1 = (m1 - m2)/(2*bx - 2*cx);
    b1 = (2*bx*m2 - 2*cx*m1)/(2*bx - 2*cx);
    c1 = (-1*a1)*bx*bx - b1*bx;
    f1 = a1*xof*xof + b1*xof + c1;
```

%--

%f1a

%is f1 flipped

%--

```
    f1a = a1*(L - xof)*(L - xof) + b1*(L - xof) + c1;
```

%--

%f2a

%dy+f1a

%--

```
    f2a = f1a + dy;
```

%--

%f2b

%my+f1a

%--

```
    f2b = f1a + my;
```

%--

%f1b

%-f1 of (xof + L)

%--

```
   a1b = (-m1 + m2)/(2*fx - 2*gx);
   b1b = (2*fx*(-m2) - 2*gx*(-m1))/(2*fx - 2*gx);
   c1b = (-1*a1b)*fx*fx - b1b*fx;
   f1b = a1b*xof*xof + b1b*xof + c1b;
   a1c = (m1 - m2)/(2*hx - 2*ix);
   b1c = (2*hx*(m2) - 2*ix*(m1))/(2*hx - 2*ix);
   c1c = (-1*a1c)*hx*hx - b1c*hx;
```

```
%--------------------------------------------------------------------
------------------
%f3a

%fy-f1b

%--------------------------------------------------------------------
------------------
   f3a = fy - f1b;

%--------------------------------------------------------------------
------------------
%f3b

%ny-f1b

%--------------------------------------------------------------------
------------------
   f3b = ny - f1b;

%--------------------------------------------------------------------
------------------
%f4c

%-f1a at 2nd point

%--------------------------------------------------------------------
------------------
   f4c = -a1c*(xof)*(xof) - b1c*(xof) - c1c;

%--------------------------------------------------------------------
------------------
%f4a

%-cy + f4c

%--------------------------------------------------------------------
------------------
   f4a = -f4c - cy;

%--------------------------------------------------------------------
------------------
%f4b

%f4c -cy

%--------------------------------------------------------------------
------------------
   f4b = -f4c - cy;

%--------------------------------------------------------------------
------------------
%returns
```

```
%x,y for x,cycle #

%-------------------------------------------------------------------------
------------------
    if (xof < bx)
      yof = ay + m1*xof;
    end
    if (xof >= bx)
      if (xof < cx)
        yof = by + a1*xof*xof + b1*xof + c1;
      end
    end
    if (xof >= cx)
      if (xof < dx)
        yof = cy + m2*(xof - cx);
      end
    end
    if (xof >= dx)
      if (xof < (L - k))
        yof = f2a;
      end
    end
    if (xof >= (L - k))
      if (xof < ex)
        yof = f2b;
      end
    end
    if (xof >= ex)
      if (xof < fx)
        yof = ey + m2*(xof - ex);
      end
    end
    if (xof >= fx)
      if (xof < (L + k))
        yof = f3a;
      end
    end
    if (xof >= (L + k))
      if (xof < gx)
        yof = f3b;
      end
    end
    if (xof >= gx)
      if (xof < hx)
        yof = gy + m2*(xof - gx);
      end
    end
    if (xof >= hx)
      if (xof < ox)
        yof = f4a;
      end
    end
    if (xof >= ox)
      if (xof < ix)
        yof = f4b;
      end
    end
    if (xof >= ix)
      if (xof < jx)
        yof = -by + m1*(xof - ix);
      end
    end
    if (xof == jx)
```

```
        yof = 0.0;
      end
      term1 = cos(pi*ii1*xof/L);
      term2 = sin(pi*ii1*xof/L);
      yof2 = -1*yof;
      dx1dy1 = dx1*yof2;
      expr1 = term1*dx1dy1;
      expr2 = term2*dx1dy1;
      sum11 = sum11 + expr1;
      sum12 = sum12 + expr2;
    end
    asubn = (1/L)*sum11;
    bsubn = (1/L)*sum12;
    if (ii1 == 0)
      asubn = asubn/2;
      bsubn = 0.0;
    end
    foura = asubn*cos(pi*ii1*xvar/L);
    fourb = bsubn*cos(pi*ii1*yvar/L);
    fprintf(fid,'N = ');
    fprintf(fid,'%4i',ii1);
    fprintf(fid,'\n');
    fprintf(fid,'A Term = ');
    fprintf(fid,'%24.20f',asubn);
    fprintf(fid,'*');
    fprintf(fid,'cos(');
    fprintf(fid,'%8.7f',pi);
    fprintf(fid,'*');
    fprintf(fid,'%1i',ii1);
    fprintf(fid,'*x/');
    fprintf(fid,'%9.8f',L);
    fprintf(fid,')\n');
    fprintf(fid,'B Term = ');
    fprintf(fid,'%24.20f',bsubn);
    fprintf(fid,'*');
    fprintf(fid,'sin(');
    fprintf(fid,'%8.7f',pi);
    fprintf(fid,'*');
    fprintf(fid,'%1i',ii1);
    fprintf(fid,'*x/');
    fprintf(fid,'%9.8f',L);
    fprintf(fid,')\n');
    fprintf(fid,'\n');
end
fclose(fid);
```

```
%-----------------------------------------------------------------------
------------------
%coilwave3.m - Program to Compute Amplitude Values for Oscillators of Coil #3 of
Magnetic Bottle
%          - Waveform is Specified by Interpolation of 200 term fourier series in
Matlab
%-----------------------------------------------------------------------
------------------
syms ax ay bx by cx cy dx dy ex ey fx fy;
syms gx gy hx hy ix iy jx jy kx ky lx ly;
syms mx my nx ny ox oy xof xofa yof yof2 m1 m2 dx1 dx1dy1 xvar yvar;
syms a1 b1 c1 f1 a2 b2 c2 a3 b3 c3 sum11 sum12 term1 term2;
syms a4 b4 c4 a1a b1a c1a f1a a1b b1b c1b expr1 expr2 pi;
syms a1c b1c c1c f1b f1c f2a f2b a1q b1q c1q fq asubn bsubn;
syms L k f3a f3b f4a f4b f4c x i1 i2 k1 loops iii1 foura fourb;
pi = 3.141592654;
L = 10;
k = 2;
k1 = 0.25;
m1 = 2.5;
m2 = -0.5;
ax = 0;
bx = k - k1 + ax;
cx = k + k1 + ax;
dx = L - k - k1 + ax;
ex = L - k + k1 + ax;
fx = L + k - k1 + ax;
gx = L + k + k1 + ax;
hx = 3*L - gx;
ix = 3*L - fx;
jx = 2*L;
kx = k + ax;
lx = 2*L - k + ax;
mx = L - k + ax;
nx = L + k + ax;
ox = 2*L - k;
ay = 0;
by = m1*(k - k1) + ay;
cy = m2*(k1) + m1*k + ay;
dy = m2*(L - 2*k - k1) + m1*k + ay;
ey = m2*(L - k + k1) + m1*k + ay;
fy = m2*(L + k - k1) + m1*k + ay;
gy = m2*(k + k1) + ay;
hy = gy;
iy = fy;
jy = 0;
ky = m1*k + ay;
ly = -m1*k + ay;
my = m2*(L - 2*k) + m1*k + ay;
ny = -1*(dy+ey)/2;
oy = -my;

fid = fopen('g:/draw1/coilwave3.out','w');
fprintf(fid,'Fourier Series of Coil #3 WaveForm');
fprintf(fid,'\n');
fprintf(fid,'----------------------------------');
fprintf(fid,'\n');
fprintf(fid,'\n');
dx1 = 2*L/1000;
for ii1 = 0:100
   sum11 = 0.0;
   sum12 = 0.0;
   for iii1 = 1:500
```

```
    xofa = iii1*2*L/1000;
    xof = 2*L - xofa;
%----------------------------------------------------------------------------
------------------
%f1

%2a1*bx + b1 = m1

%2a1*cx + b1 = m2

%c1 = -a1*bx^2 - b1*bx

%----------------------------------------------------------------------------
------------------
    a1 = (m1 - m2)/(2*bx - 2*cx);
    b1 = (2*bx*m2 - 2*cx*m1)/(2*bx - 2*cx);
    c1 = (-1*a1)*bx*bx - b1*bx;
    f1 = a1*xof*xof + b1*xof + c1;

%----------------------------------------------------------------------------
------------------
%f1a

%is f1 flipped

%----------------------------------------------------------------------------
------------------
    f1a = a1*(L - xof)*(L - xof) + b1*(L - xof) + c1;

%----------------------------------------------------------------------------
------------------
%f2a

%dy+f1a

%----------------------------------------------------------------------------
------------------
    f2a = f1a + dy;

%----------------------------------------------------------------------------
------------------
%f2b

%my+f1a

%----------------------------------------------------------------------------
------------------
    f2b = f1a + my;

%----------------------------------------------------------------------------
------------------
%f1b

%-f1 of (xof + L)

%----------------------------------------------------------------------------
------------------
    a1b = (-m1 + m2)/(2*fx - 2*gx);
    b1b = (2*fx*(-m2) - 2*gx*(-m1))/(2*fx - 2*gx);
    c1b = (-1*a1b)*fx*fx - b1b*fx;
    f1b = a1b*xof*xof + b1b*xof + c1b;
    a1c = (m1 - m2)/(2*hx - 2*ix);
    b1c = (2*hx*(m2) - 2*ix*(m1))/(2*hx - 2*ix);
```

```
    c1c = (-1*a1c)*hx*hx - b1c*hx;


%--------------------------------------------------------------------------
------------------
%f3a

%fy-f1b

%--------------------------------------------------------------------------
------------------
    f3a = fy - f1b;

%--------------------------------------------------------------------------
------------------
%f3b

%ny-f1b

%--------------------------------------------------------------------------
------------------
    f3b = ny - f1b;

%--------------------------------------------------------------------------
------------------
%f4c

%-f1a at 2nd point

%--------------------------------------------------------------------------
------------------
    f4c = -a1c*(xof)*(xof) - b1c*(xof) - c1c;

%--------------------------------------------------------------------------
------------------
%f4a

%-cy + f4c

%--------------------------------------------------------------------------
------------------
    f4a = -f4c - cy;

%--------------------------------------------------------------------------
------------------
%f4b

%f4c -cy

%--------------------------------------------------------------------------
------------------
    f4b = -f4c - cy;

%--------------------------------------------------------------------------
------------------
%returns

%x,y for x,cycle #

%--------------------------------------------------------------------------
------------------
    if (xof < bx)
      yof = ay + m1*xof;
```

```
end
if (xof >= bx)
   if (xof < cx)
     yof = by + a1*xof*xof + b1*xof + c1;
   end
end
if (xof >= cx)
   if (xof < dx)
     yof = cy + m2*(xof - cx);
   end
end
if (xof >= dx)
   if (xof < (L - k))
     yof = f2a;
   end
end
if (xof >= (L - k))
   if (xof < ex)
     yof = f2b;
   end
end
if (xof >= ex)
   if (xof < fx)
     yof = ey + m2*(xof - ex);
   end
end
if (xof >= fx)
   if (xof < (L + k))
     yof = f3a;
   end
end
if (xof >= (L + k))
   if (xof < gx)
     yof = f3b;
   end
end
if (xof >= gx)
   if (xof < hx)
     yof = gy + m2*(xof - gx);
   end
end
if (xof >= hx)
   if (xof < ox)
     yof = f4a;
   end
end
if (xof >= ox)
   if (xof < ix)
     yof = f4b;
   end
end
if (xof >= ix)
   if (xof < jx)
     yof = -by + m1*(xof - ix);
   end
end
if (xof == jx)
   yof = 0.0;
end
term1 = cos(pi*ii1*xof/L);
term2 = sin(pi*ii1*xof/L);
dx1dy1 = dx1*yof;
expr1 = term1*dx1dy1;
```

```
    expr2 = term2*dx1dy1;
    sum11 = sum11 + expr1;
    sum12 = sum12 + expr2;
  end
  for iii1 = 501:1000
    xofa = iii1*2*L/1000;
    xof = xofa - 2*L;
```
%--

%f1

%2a1*bx + b1 = m1

%2a1*cx + b1 = m2

%c1 = -a1*bx^2 - b1*bx

%--

```
    a1 = (m1 - m2)/(2*bx - 2*cx);
    b1 = (2*bx*m2 - 2*cx*m1)/(2*bx - 2*cx);
    c1 = (-1*a1)*bx*bx - b1*bx;
    f1 = a1*xof*xof + b1*xof + c1;
```
%--

%f1a

%is f1 flipped

%--

```
    f1a = a1*(L - xof)*(L - xof) + b1*(L - xof) + c1;
```
%--

%f2a

%dy+f1a

%--

```
    f2a = f1a + dy;
```
%--

%f2b

%my+f1a

%--

```
    f2b = f1a + my;
```
%--

%f1b

%-f1 of (xof + L)

%--

```
    a1b = (-m1 + m2)/(2*fx - 2*gx);
```

```
b1b = (2*fx*(-m2) - 2*gx*(-m1))/(2*fx - 2*gx);
c1b = (-1*a1b)*fx*fx - b1b*fx;
f1b = a1b*xof*xof + b1b*xof + c1b;
a1c = (m1 - m2)/(2*hx - 2*ix);
b1c = (2*hx*(m2) - 2*ix*(m1))/(2*hx - 2*ix);
c1c = (-1*a1c)*hx*hx - b1c*hx;
```

%--

%f3a

%fy-f1b

%--

```
     f3a = fy - f1b;
```

%--

%f3b

%ny-f1b

%--

```
     f3b = ny - f1b;
```

%--

%f4c

%-f1a at 2nd point

%--

```
     f4c = -a1c*(xof)*(xof) - b1c*(xof) - c1c;
```

%--

%f4a

%-cy + f4c

%--

```
     f4a = -f4c - cy;
```

%--

%f4b

%f4c -cy

%--

```
     f4b = -f4c - cy;
```

%--

%returns

%x,y for x,cycle #

```
%-------------------------------------------------------------------------------
------------------
      if (xof < bx)
        yof = ay + m1*xof;
      end
      if (xof >= bx)
        if (xof < cx)
          yof = by + a1*xof*xof + b1*xof + c1;
        end
      end
      if (xof >= cx)
        if (xof < dx)
          yof = cy + m2*(xof - cx);
        end
      end
      if (xof >= dx)
        if (xof < (L - k))
          yof = f2a;
        end
      end
      if (xof >= (L - k))
        if (xof < ex)
          yof = f2b;
        end
      end
      if (xof >= ex)
        if (xof < fx)
          yof = ey + m2*(xof - ex);
        end
      end
      if (xof >= fx)
        if (xof < (L + k))
          yof = f3a;
        end
      end
      if (xof >= (L + k))
        if (xof < gx)
          yof = f3b;
        end
      end
      if (xof >= gx)
        if (xof < hx)
          yof = gy + m2*(xof - gx);
        end
      end
      if (xof >= hx)
        if (xof < ox)
          yof = f4a;
        end
      end
      if (xof >= ox)
        if (xof < ix)
          yof = f4b;
        end
      end
      if (xof >= ix)
        if (xof < jx)
          yof = -by + m1*(xof - ix);
        end
      end
      if (xof == jx)
        yof = 0.0;
```

```
      end
      term1 = cos(pi*ii1*xof/L);
      term2 = sin(pi*ii1*xof/L);
      yof2 = 1*yof;
      dx1dy1 = dx1*yof2;
      expr1 = term1*dx1dy1;
      expr2 = term2*dx1dy1;
      sum11 = sum11 + expr1;
      sum12 = sum12 + expr2;
    end
    asubn = (1/L)*sum11;
    bsubn = (1/L)*sum12;
    if (ii1 == 0)
      asubn = asubn/2;
      bsubn = 0.0;
    end
    foura = asubn*cos(pi*ii1*xvar/L);
    fourb = bsubn*cos(pi*ii1*yvar/L);
    fprintf(fid,'N = ');
    fprintf(fid,'%4i',ii1);
    fprintf(fid,'\n');
    fprintf(fid,'A Term = ');
    fprintf(fid,'%24.20f',asubn);
    fprintf(fid,'*');
    fprintf(fid,'cos(');
    fprintf(fid,'%8.7f',pi);
    fprintf(fid,'*');
    fprintf(fid,'%1i',ii1);
    fprintf(fid,'*x/');
    fprintf(fid,'%9.8f',L);
    fprintf(fid,')\n');
    fprintf(fid,'B Term = ');
    fprintf(fid,'%24.20f',bsubn);
    fprintf(fid,'*');
    fprintf(fid,'sin(');
    fprintf(fid,'%8.7f',pi);
    fprintf(fid,'*');
    fprintf(fid,'%1i',ii1);
    fprintf(fid,'*x/');
    fprintf(fid,'%9.8f',L);
    fprintf(fid,')\n');
    fprintf(fid,'\n');
end
fclose(fid);
```

```
%------------------------------------------------------------------------------
------------------
%coilwave2.m - Program to Compute Amplitude Values for Oscillators of Coil #2 of
Magnetic Bottle
%          - Waveform is Specified by Interpolation of 200 term fourier series in
Matlab
%------------------------------------------------------------------------------
------------------
syms ax ay bx by cx cy dx dy ex ey fx fy;
syms gx gy hx hy ix iy jx jy kx ky lx ly;
syms mx my nx ny ox oy xof xofa yof yof2 m1 m2 dx1 dx1dy1 xvar yvar;
syms a1 b1 c1 f1 a2 b2 c2 a3 b3 c3 sum11 sum12 term1 term2;
syms a4 b4 c4 a1a b1a c1a f1a a1b b1b c1b expr1 expr2 pi;
syms a1c b1c c1c f1b f1c f2a f2b a1q b1q c1q fq asubn bsubn;
syms L k f3a f3b f4a f4b f4c x i1 i2 k1 loops iii1 foura fourb;
pi = 3.141592654;
L = 10;
k = 2;
k1 = 0.25;
m1 = 2.5;
m2 = -0.5;
ax = 0;
bx = k - k1 + ax;
cx = k + k1 + ax;
dx = L - k - k1 + ax;
ex = L - k + k1 + ax;
fx = L + k - k1 + ax;
gx = L + k + k1 + ax;
hx = 3*L - gx;
ix = 3*L - fx;
jx = 2*L;
kx = k + ax;
lx = 2*L - k + ax;
mx = L - k + ax;
nx = L + k + ax;
ox = 2*L - k;
ay = 0;
by = m1*(k - k1) + ay;
cy = m2*(k1) + m1*k + ay;
dy = m2*(L - 2*k - k1) + m1*k + ay;
ey = m2*(L - k + k1) + m1*k + ay;
fy = m2*(L + k - k1) + m1*k + ay;
gy = m2*(k + k1) + ay;
hy = gy;
iy = fy;
jy = 0;
ky = m1*k + ay;
ly = -m1*k + ay;
my = m2*(L - 2*k) + m1*k + ay;
ny = -1*(dy+ey)/2;
oy = -my;

fid = fopen('g:/draw1/coilwave2.out','w');
fprintf(fid,'Fourier Series of Coil #2 WaveForm');
fprintf(fid,'\n');
fprintf(fid,'-----------------------------------');
fprintf(fid,'\n');
fprintf(fid,'\n');
dx1 = 2*L/1000;
for iii1 = 0:100
   sum11 = 0.0;
   sum12 = 0.0;
   for iii1 = 1:500
```

```
      xofa = iii1*2*L/1000;
      xof = L - xofa;
%--------------------------------------------------------------------------
------------------
%f1

%2a1*bx + b1 = m1

%2a1*cx + b1 = m2

%c1 = -a1*bx^2 - b1*bx

%--------------------------------------------------------------------------
------------------
      a1 = (m1 - m2)/(2*bx - 2*cx);
      b1 = (2*bx*m2 - 2*cx*m1)/(2*bx - 2*cx);
      c1 = (-1*a1)*bx*bx - b1*bx;
      f1 = a1*xof*xof + b1*xof + c1;

%--------------------------------------------------------------------------
------------------
%f1a

%is f1 flipped

%--------------------------------------------------------------------------
------------------
      f1a = a1*(L - xof)*(L - xof) + b1*(L - xof) + c1;

%--------------------------------------------------------------------------
------------------
%f2a

%dy+f1a

%--------------------------------------------------------------------------
------------------
      f2a = f1a + dy;

%--------------------------------------------------------------------------
------------------
%f2b

%my+f1a

%--------------------------------------------------------------------------
------------------
      f2b = f1a + my;

%--------------------------------------------------------------------------
------------------
%f1b

%-f1 of (xof + L)

%--------------------------------------------------------------------------
------------------
      a1b = (-m1 + m2)/(2*fx - 2*gx);
      b1b = (2*fx*(-m2) - 2*gx*(-m1))/(2*fx - 2*gx);
      c1b = (-1*a1b)*fx*fx - b1b*fx;
      f1b = a1b*xof*xof + b1b*xof + c1b;
      a1c = (m1 - m2)/(2*hx - 2*ix);
      b1c = (2*hx*(m2) - 2*ix*(m1))/(2*hx - 2*ix);
```

```
    c1c = (-1*a1c)*hx*hx - b1c*hx;


%--------------------------------------------------------------------
-------------------
%f3a

%fy-f1b

%--------------------------------------------------------------------
-------------------
    f3a = fy - f1b;

%--------------------------------------------------------------------
-------------------
%f3b

%ny-f1b

%--------------------------------------------------------------------
-------------------
    f3b = ny - f1b;

%--------------------------------------------------------------------
-------------------
%f4c

%-f1a at 2nd point

%--------------------------------------------------------------------
-------------------
    f4c = -a1c*(xof)*(xof) - b1c*(xof) - c1c;

%--------------------------------------------------------------------
-------------------
%f4a

%-cy + f4c

%--------------------------------------------------------------------
-------------------
    f4a = -f4c - cy;

%--------------------------------------------------------------------
-------------------
%f4b

%f4c -cy

%--------------------------------------------------------------------
-------------------
    f4b = -f4c - cy;

%--------------------------------------------------------------------
-------------------
%returns

%x,y for x,cycle #

%--------------------------------------------------------------------
-------------------
    if (xof < bx)
      yof = ay + m1*xof;
```

```
end
if (xof >= bx)
   if (xof < cx)
      yof = by + a1*xof*xof + b1*xof + c1;
   end
end
if (xof >= cx)
   if (xof < dx)
      yof = cy + m2*(xof - cx);
   end
end
if (xof >= dx)
   if (xof < (L - k))
      yof = f2a;
   end
end
if (xof >= (L - k))
   if (xof < ex)
      yof = f2b;
   end
end
if (xof >= ex)
   if (xof < fx)
      yof = ey + m2*(xof - ex);
   end
end
if (xof >= fx)
   if (xof < (L + k))
      yof = f3a;
   end
end
if (xof >= (L + k))
   if (xof < gx)
      yof = f3b;
   end
end
if (xof >= gx)
   if (xof < hx)
      yof = gy + m2*(xof - gx);
   end
end
if (xof >= hx)
   if (xof < ox)
      yof = f4a;
   end
end
if (xof >= ox)
   if (xof < ix)
      yof = f4b;
   end
end
if (xof >= ix)
   if (xof < jx)
      yof = -by + m1*(xof - ix);
   end
end
if (xof == jx)
   yof = 0.0;
end
term1 = cos(pi*ii1*xof/L);
term2 = sin(pi*ii1*xof/L);
yof2 = -1*yof;
dx1dy1 = dx1*yof2;
```

```
      expr1 = term1*dx1dy1;
      expr2 = term2*dx1dy1;
      sum11 = sum11 + expr1;
      sum12 = sum12 + expr2;
    end
    for iii1 = 501:1000
      xofa = iii1*2*L/1000;
      xof = xofa - L;
```
%---

%f1

%2a1*bx + b1 = m1

%2a1*cx + b1 = m2

%c1 = -a1*bx^2 - b1*bx

%---

```
      a1 = (m1 - m2)/(2*bx - 2*cx);
      b1 = (2*bx*m2 - 2*cx*m1)/(2*bx - 2*cx);
      c1 = (-1*a1)*bx*bx - b1*bx;
      f1 = a1*xof*xof + b1*xof + c1;
```
%---

%f1a

%is f1 flipped

%---

```
      f1a = a1*(L - xof)*(L - xof) + b1*(L - xof) + c1;
```
%---

%f2a

%dy+f1a

%---

```
      f2a = f1a + dy;
```
%---

%f2b

%my+f1a

%---

```
      f2b = f1a + my;
```
%---

%f1b

%-f1 of (xof + L)

%---

```
a1b = (-m1 + m2)/(2*fx - 2*gx);
b1b = (2*fx*(-m2) - 2*gx*(-m1))/(2*fx - 2*gx);
c1b = (-1*a1b)*fx*fx - b1b*fx;
f1b = a1b*xof*xof + b1b*xof + c1b;
a1c = (m1 - m2)/(2*hx - 2*ix);
b1c = (2*hx*(m2) - 2*ix*(m1))/(2*hx - 2*ix);
c1c = (-1*a1c)*hx*hx - b1c*hx;
```

%--

%f3a

%fy-f1b

%--

```
    f3a = fy - f1b;
```

%--

%f3b

%ny-f1b

%--

```
    f3b = ny - f1b;
```

%--

%f4c

%-f1a at 2nd point

%--

```
    f4c = -a1c*(xof)*(xof) - b1c*(xof) - c1c;
```

%--

%f4a

%-cy + f4c

%--

```
    f4a = -f4c - cy;
```

%--

%f4b

%f4c -cy

%--

```
    f4b = -f4c - cy;
```

%--

%returns

```
%x,y for x,cycle #

%-----------------------------------------------------------------------------
------------------
     if (xof < bx)
       yof = ay + m1*xof;
     end
     if (xof >= bx)
       if (xof < cx)
         yof = by + a1*xof*xof + b1*xof + c1;
       end
     end
     if (xof >= cx)
       if (xof < dx)
         yof = cy + m2*(xof - cx);
       end
     end
     if (xof >= dx)
       if (xof < (L - k))
         yof = f2a;
       end
     end
     if (xof >= (L - k))
       if (xof < ex)
         yof = f2b;
       end
     end
     if (xof >= ex)
       if (xof < fx)
         yof = ey + m2*(xof - ex);
       end
     end
     if (xof >= fx)
       if (xof < (L + k))
         yof = f3a;
       end
     end
     if (xof >= (L + k))
       if (xof < gx)
         yof = f3b;
       end
     end
     if (xof >= gx)
       if (xof < hx)
         yof = gy + m2*(xof - gx);
       end
     end
     if (xof >= hx)
       if (xof < ox)
         yof = f4a;
       end
     end
     if (xof >= ox)
       if (xof < ix)
         yof = f4b;
       end
     end
     if (xof >= ix)
       if (xof < jx)
         yof = -by + m1*(xof - ix);
       end
     end
     if (xof == jx)
```

```
%x,y for x,cycle #

%------------------------------------------------------------------------------------
------------------
    if (xof < bx)
      yof = ay + m1*xof;
    end
    if (xof >= bx)
      if (xof < cx)
        yof = by + a1*xof*xof + b1*xof + c1;
      end
    end
    if (xof >= cx)
      if (xof < dx)
        yof = cy + m2*(xof - cx);
      end
    end
    if (xof >= dx)
      if (xof < (L - k))
        yof = f2a;
      end
    end
    if (xof >= (L - k))
      if (xof < ex)
        yof = f2b;
      end
    end
    if (xof >= ex)
      if (xof < fx)
        yof = ey + m2*(xof - ex);
      end
    end
    if (xof >= fx)
      if (xof < (L + k))
        yof = f3a;
      end
    end
    if (xof >= (L + k))
      if (xof < gx)
        yof = f3b;
      end
    end
    if (xof >= gx)
      if (xof < hx)
        yof = gy + m2*(xof - gx);
      end
    end
    if (xof >= hx)
      if (xof < ox)
        yof = f4a;
      end
    end
    if (xof >= ox)
      if (xof < ix)
        yof = f4b;
      end
    end
    if (xof >= ix)
      if (xof < jx)
        yof = -by + m1*(xof - ix);
      end
    end
    if (xof == jx)
```

```
      yof = 0.0;
   end
   term1 = cos(pi*ii1*xof/L);
   term2 = sin(pi*ii1*xof/L);
   yof2 = -1*yof;
   dx1dy1 = dx1*yof2;
   expr1 = term1*dx1dy1;
   expr2 = term2*dx1dy1;
   sum11 = sum11 + expr1;
   sum12 = sum12 + expr2;
  end
  asubn = (1/L)*sum11;
  bsubn = (1/L)*sum12;
  if (ii1 == 0)
    asubn = asubn/2;
    bsubn = 0.0;
  end
  foura = asubn*cos(pi*ii1*xvar/L);
  fourb = bsubn*cos(pi*ii1*yvar/L);
  fprintf(fid,'N = ');
  fprintf(fid,'%4i',ii1);
  fprintf(fid,'\n');
  fprintf(fid,'A Term = ');
  fprintf(fid,'%24.20f',asubn);
  fprintf(fid,'*');
  fprintf(fid,'cos(');
  fprintf(fid,'%8.7f',pi);
  fprintf(fid,'*');
  fprintf(fid,'%1i',ii1);
  fprintf(fid,'*x/');
  fprintf(fid,'%9.8f',L);
  fprintf(fid,')\n');
  fprintf(fid,'B Term = ');
  fprintf(fid,'%24.20f',bsubn);
  fprintf(fid,'*');
  fprintf(fid,'sin(');
  fprintf(fid,'%8.7f',pi);
  fprintf(fid,'*');
  fprintf(fid,'%1i',ii1);
  fprintf(fid,'*x/');
  fprintf(fid,'%9.8f',L);
  fprintf(fid,')\n');
  fprintf(fid,'\n');
 end
fclose(fid);
```

```
%--------------------------------------------------------------------------
------------------
%coilwave1.m - Program to Compute Amplitude Values for Oscillators of Coil #1 of
Magnetic Bottle
%           - Waveform is Specified by Interpolation of 200 term fourier series in
Matlab
%--------------------------------------------------------------------------
------------------
syms ax ay bx by cx cy dx dy ex ey fx fy;
syms gx gy hx hy ix iy jx jy kx ky lx ly;
syms mx my nx ny ox oy xof yof m1 m2 dx1 dx1dy1 xvar yvar;
syms a1 b1 c1 f1 a2 b2 c2 a3 b3 c3 sum11 sum12 term1 term2;
syms a4 b4 c4 a1a b1a c1a f1a a1b b1b c1b expr1 expr2 pi;
syms a1c b1c c1c f1b f1c f2a f2b a1q b1q c1q fq asubn bsubn;
syms L k f3a f3b f4a f4b f4c x i1 i2 k1 loops iii1 foura fourb;
pi = 3.141592654;
L = 10;
k = 2;
k1 = 0.25;
m1 = 2.5;
m2 = -0.5;
ax = 0;
bx = k - k1 + ax;
cx = k + k1 + ax;
dx = L - k - k1 + ax;
ex = L - k + k1 + ax;
fx = L + k - k1 + ax;
gx = L + k + k1 + ax;
hx = 3*L - gx;
ix = 3*L - fx;
jx = 2*L;
kx = k + ax;
lx = 2*L - k + ax;
mx = L - k + ax;
nx = L + k + ax;
ox = 2*L - k;
ay = 0;
by = m1*(k - k1) + ay;
cy = m2*(k1) + m1*k + ay;
dy = m2*(L - 2*k - k1) + m1*k + ay;
ey = m2*(L - k + k1) + m1*k + ay;
fy = m2*(L + k - k1) + m1*k + ay;
gy = m2*(k + k1) + ay;
hy = gy;
iy = fy;
jy = 0;
ky = m1*k + ay;
ly = -m1*k + ay;
my = m2*(L - 2*k) + m1*k + ay;
ny = -1*(dy+ey)/2;
oy = -my;

fid = fopen('g:/draw1/coilwave1.out','w');
fprintf(fid,'Fourier Series of Coil #1 WaveForm');
fprintf(fid,'\n');
fprintf(fid,'----------------------------------');
fprintf(fid,'\n');
fprintf(fid,'\n');
dx1 = 2*L/1000;
for ii1 = 0:100
   sum11 = 0.0;
   sum12 = 0.0;
   for iii1 = 1:1000
```

```
    xof = iii1*2*L/1000;
%-------------------------------------------------------------------------
------------------
%f1

%2a1*bx + b1 = m1

%2a1*cx + b1 = m2

%c1 = -a1*bx^2 - b1*bx

%-------------------------------------------------------------------------
------------------
    a1 = (m1 - m2)/(2*bx - 2*cx);
    b1 = (2*bx*m2 - 2*cx*m1)/(2*bx - 2*cx);
    c1 = (-1*a1)*bx*bx - b1*bx;
    f1 = a1*xof*xof + b1*xof + c1;

%-------------------------------------------------------------------------
------------------
%f1a

%is f1 flipped

%-------------------------------------------------------------------------
------------------
    f1a = a1*(L - xof)*(L - xof) + b1*(L - xof) + c1;

%-------------------------------------------------------------------------
------------------
%f2a

%dy+f1a

%-------------------------------------------------------------------------
------------------
    f2a = f1a + dy;

%-------------------------------------------------------------------------
------------------
%f2b

%my+f1a

%-------------------------------------------------------------------------
------------------
    f2b = f1a + my;

%-------------------------------------------------------------------------
------------------
%f1b

%-f1 of (xof + L)

%-------------------------------------------------------------------------
------------------
    a1b = (-m1 + m2)/(2*fx - 2*gx);
    b1b = (2*fx*(-m2) - 2*gx*(-m1))/(2*fx - 2*gx);
    c1b = (-1*a1b)*fx*fx - b1b*fx;
    f1b = a1b*xof*xof + b1b*xof + c1b;
    a1c = (m1 - m2)/(2*hx - 2*ix);
    b1c = (2*hx*(m2) - 2*ix*(m1))/(2*hx - 2*ix);
    c1c = (-1*a1c)*hx*hx - b1c*hx;
```

```
%----------------------------------------------------------------------
-----------------
%f3a

%fy-f1b

%----------------------------------------------------------------------
-----------------
    f3a = fy - f1b;

%----------------------------------------------------------------------
-----------------
%f3b

%ny-f1b

%----------------------------------------------------------------------
-----------------
    f3b = ny - f1b;

%----------------------------------------------------------------------
-----------------
%f4c

%-f1a at 2nd point

%----------------------------------------------------------------------
-----------------
    f4c = -a1c*(xof)*(xof) - b1c*(xof) - c1c;

%----------------------------------------------------------------------
-----------------
%f4a

%-cy + f4c

%----------------------------------------------------------------------
-----------------
    f4a = -f4c - cy;

%----------------------------------------------------------------------
-----------------
%f4b

%f4c -cy

%----------------------------------------------------------------------
-----------------
    f4b = -f4c - cy;

%----------------------------------------------------------------------
-----------------
%returns

%x,y for x,cycle #

%----------------------------------------------------------------------
-----------------
    if (xof < bx)
      yof = ay + m1*xof;
    end
```

```
if (xof >= bx)
  if (xof < cx)
    yof = by + a1*xof*xof + b1*xof + c1;
  end
end
if (xof >= cx)
  if (xof < dx)
    yof = cy + m2*(xof - cx);
  end
end
if (xof >= dx)
  if (xof < (L - k))
    yof = f2a;
  end
end
if (xof >= (L - k))
  if (xof < ex)
    yof = f2b;
  end
end
if (xof >= ex)
  if (xof < fx)
    yof = ey + m2*(xof - ex);
  end
end
if (xof >= fx)
  if (xof < (L + k))
    yof = f3a;
  end
end
if (xof >= (L + k))
  if (xof < gx)
    yof = f3b;
  end
end
if (xof >= gx)
  if (xof < hx)
    yof = gy + m2*(xof - gx);
  end
end
if (xof >= hx)
  if (xof < ox)
    yof = f4a;
  end
end
if (xof >= ox)
  if (xof < ix)
    yof = f4b;
  end
end
if (xof >= ix)
  if (xof < jx)
    yof = -by + m1*(xof - ix);
  end
end
if (xof == jx)
  yof = 0.0;
end
term1 = cos(pi*ii1*xof/L);
term2 = sin(pi*ii1*xof/L);
dx1dy1 = dx1*yof;
expr1 = term1*dx1dy1;
expr2 = term2*dx1dy1;
```

```
      sum11 = sum11 + expr1;
      sum12 = sum12 + expr2;
   end
   asubn = (1/L)*sum11;
   bsubn = (1/L)*sum12;
   if (ii1 == 0)
      asubn = asubn/2;
      bsubn = 0.0;
   end
   foura = asubn*cos(pi*ii1*xvar/L);
   fourb = bsubn*cos(pi*ii1*yvar/L);
   fprintf(fid,'N = ');
   fprintf(fid,'%4i',ii1);
   fprintf(fid,'\n');
   fprintf(fid,'A Term = ');
   fprintf(fid,'%24.20f',asubn);
   fprintf(fid,'*');
   fprintf(fid,'cos(');
   fprintf(fid,'%8.7f',pi);
   fprintf(fid,'*');
   fprintf(fid,'%1i',ii1);
   fprintf(fid,'*x/');
   fprintf(fid,'%9.8f',L);
   fprintf(fid,')\n');
   fprintf(fid,'B Term = ');
   fprintf(fid,'%24.20f',bsubn);
   fprintf(fid,'*');
   fprintf(fid,'sin(');
   fprintf(fid,'%8.7f',pi);
   fprintf(fid,'*');
   fprintf(fid,'%1i',ii1);
   fprintf(fid,'*x/');
   fprintf(fid,'%9.8f',L);
   fprintf(fid,')\n');
   fprintf(fid,'\n');
end
fclose(fid);
```

Fourier Series of Coil #1 WaveForm

```
N =      0
A Term =    0.32151000000000080000*cos(3.1415927*0*x/10.00000000)
B Term =    0.00000000000000000000*sin(3.1415927*0*x/10.00000000)

N =      1
A Term =   -0.05486015000563282400*cos(3.1415927*1*x/10.00000000)
B Term =    3.59960771976998780000*sin(3.1415927*1*x/10.00000000)

N =      2
A Term =   -0.28606410623826406000*cos(3.1415927*2*x/10.00000000)
B Term =    1.31790776415870600000*sin(3.1415927*2*x/10.00000000)

N =      3
A Term =    0.02127969436458058600*cos(3.1415927*3*x/10.00000000)
B Term =    0.68364708872142377000*sin(3.1415927*3*x/10.00000000)

N =      4
A Term =   -0.12370743263194371000*cos(3.1415927*4*x/10.00000000)
B Term =    0.32864714547868346000*sin(3.1415927*4*x/10.00000000)

N =      5
A Term =    0.06624931097526866300*cos(3.1415927*5*x/10.00000000)
B Term =   -0.00202007584984204580*sin(3.1415927*5*x/10.00000000)

N =      6
A Term =    0.02232680536410826600*cos(3.1415927*6*x/10.00000000)
B Term =   -0.00262224676588311510*sin(3.1415927*6*x/10.00000000)

N =      7
A Term =    0.01892140443709789500*cos(3.1415927*7*x/10.00000000)
B Term =   -0.15843526909556116000*sin(3.1415927*7*x/10.00000000)

N =      8
A Term =    0.07502481994225042300*cos(3.1415927*8*x/10.00000000)
B Term =   -0.08235904454089781900*sin(3.1415927*8*x/10.00000000)

N =      9
A Term =   -0.05130372995787575700*cos(3.1415927*9*x/10.00000000)
B Term =   -0.06472085885657588600*sin(3.1415927*9*x/10.00000000)

N =     10
A Term =    0.03963932407652325000*cos(3.1415927*10*x/10.00000000)
B Term =   -0.04893408424081575200*sin(3.1415927*10*x/10.00000000)

N =     11
A Term =   -0.04741530329485993400*cos(3.1415927*11*x/10.00000000)
B Term =    0.05525853461247107900*sin(3.1415927*11*x/10.00000000)

N =     12
A Term =   -0.01948282817234723400*cos(3.1415927*12*x/10.00000000)
B Term =    0.00185072898389278590*sin(3.1415927*12*x/10.00000000)

N =     13
A Term =    0.01923342680901290300*cos(3.1415927*13*x/10.00000000)
B Term =    0.06647372279285850000*sin(3.1415927*13*x/10.00000000)

N =     14
A Term =   -0.04283176627266559900*cos(3.1415927*14*x/10.00000000)
B Term =    0.02297951841575042500*sin(3.1415927*14*x/10.00000000)
```

```
N =    15
A Term =    0.05318462413540643600*cos(3.1415927*15*x/10.00000000)
B Term =   -0.00555508117389191380*sin(3.1415927*15*x/10.00000000)

N =    16
A Term =   -0.01966295136883588000*cos(3.1415927*16*x/10.00000000)
B Term =    0.01622586292254936700*sin(3.1415927*16*x/10.00000000)

N =    17
A Term =    0.01325992646096467800*cos(3.1415927*17*x/10.00000000)
B Term =   -0.05034501867654114800*sin(3.1415927*17*x/10.00000000)

N =    18
A Term =    0.01739919222397608500*cos(3.1415927*18*x/10.00000000)
B Term =    0.00231256317432152740*sin(3.1415927*18*x/10.00000000)

N =    19
A Term =   -0.03784310796783909400*cos(3.1415927*19*x/10.00000000)
B Term =   -0.02026438592921991900*sin(3.1415927*19*x/10.00000000)

N =    20
A Term =    0.03054541665948651300*cos(3.1415927*20*x/10.00000000)
B Term =   -0.00685818717707770060*sin(3.1415927*20*x/10.00000000)

N =    21
A Term =   -0.03175351239314501400*cos(3.1415927*21*x/10.00000000)
B Term =    0.02760073001586024400*sin(3.1415927*21*x/10.00000000)

N =    22
A Term =    0.01097494260098336200*cos(3.1415927*22*x/10.00000000)
B Term =   -0.00998983404396259350*sin(3.1415927*22*x/10.00000000)

N =    23
A Term =    0.01326094124579632100*cos(3.1415927*23*x/10.00000000)
B Term =    0.02764880007382740700*sin(3.1415927*23*x/10.00000000)

N =    24
A Term =   -0.01736471933434124600*cos(3.1415927*24*x/10.00000000)
B Term =   -0.00639988620723064890*sin(3.1415927*24*x/10.00000000)

N =    25
A Term =    0.03163208011535725100*cos(3.1415927*25*x/10.00000000)
B Term =   -0.00775663763005859670*sin(3.1415927*25*x/10.00000000)

N =    26
A Term =   -0.02432662006972984000*cos(3.1415927*26*x/10.00000000)
B Term =    0.00327613106619350360*sin(3.1415927*26*x/10.00000000)

N =    27
A Term =    0.00647780727335501610*cos(3.1415927*27*x/10.00000000)
B Term =   -0.02273594482710212700*sin(3.1415927*27*x/10.00000000)

N =    28
A Term =   -0.00448567468792871430*cos(3.1415927*28*x/10.00000000)
B Term =    0.01081935869544950500*sin(3.1415927*28*x/10.00000000)

N =    29
A Term =   -0.01901986543122055300*cos(3.1415927*29*x/10.00000000)
B Term =   -0.00321493589944499970*sin(3.1415927*29*x/10.00000000)

N =    30
A Term =    0.01847807299492187200*cos(3.1415927*30*x/10.00000000)
B Term =    0.00680464415618746090*sin(3.1415927*30*x/10.00000000)
```

```
N =    31
A Term =  -0.01335542965674995700*cos(3.1415927*31*x/10.00000000)
B Term =   0.01397175417416619100*sin(3.1415927*31*x/10.00000000)

N =    32
A Term =   0.01895225373098448400*cos(3.1415927*32*x/10.00000000)
B Term =  -0.00540025280609754060*sin(3.1415927*32*x/10.00000000)

N =    33
A Term =   0.00525239301261612970*cos(3.1415927*33*x/10.00000000)
B Term =   0.00539726191049372510*sin(3.1415927*33*x/10.00000000)

N =    34
A Term =  -0.00181500168679699890*cos(3.1415927*34*x/10.00000000)
B Term =  -0.01111043822350311700*sin(3.1415927*34*x/10.00000000)

N =    35
A Term =   0.00884024988157692920*cos(3.1415927*35*x/10.00000000)
B Term =  -0.00826646205777484790*sin(3.1415927*35*x/10.00000000)

N =    36
A Term =  -0.01853781900409428100*cos(3.1415927*36*x/10.00000000)
B Term =  -0.00326373777604168450*sin(3.1415927*36*x/10.00000000)

N =    37
A Term =   0.00090858332093911483*cos(3.1415927*37*x/10.00000000)
B Term =  -0.00369006018012366060*sin(3.1415927*37*x/10.00000000)

N =    38
A Term =  -0.01260582756548626700*cos(3.1415927*38*x/10.00000000)
B Term =   0.00766565536988162570*sin(3.1415927*38*x/10.00000000)

N =    39
A Term =  -0.00095468235656087977*cos(3.1415927*39*x/10.00000000)
B Term =   0.00759183857054968050*sin(3.1415927*39*x/10.00000000)

N =    40
A Term =   0.00682897771037084020*cos(3.1415927*40*x/10.00000000)
B Term =   0.00802591596683270920*sin(3.1415927*40*x/10.00000000)

N =    41
A Term =   0.00186672892665128720*cos(3.1415927*41*x/10.00000000)
B Term =   0.00361371471043719660*sin(3.1415927*41*x/10.00000000)

N =    42
A Term =   0.01612278857333271400*cos(3.1415927*42*x/10.00000000)
B Term =  -0.00087980358413492659*sin(3.1415927*42*x/10.00000000)

N =    43
A Term =  -0.00225531366458747200*cos(3.1415927*43*x/10.00000000)
B Term =  -0.00901880275721605310*sin(3.1415927*43*x/10.00000000)

N =    44
A Term =   0.00618230530849278250*cos(3.1415927*44*x/10.00000000)
B Term =  -0.00653418431482273060*sin(3.1415927*44*x/10.00000000)

N =    45
A Term =  -0.00821891555902279710*cos(3.1415927*45*x/10.00000000)
B Term =  -0.00729067528682695450*sin(3.1415927*45*x/10.00000000)

N =    46
A Term =  -0.00900751434422850970*cos(3.1415927*46*x/10.00000000)
```

B Term = -0.00337286820234028320*sin(3.1415927*46*x/10.00000000)

N =   47
A Term = -0.00190034301289706460*cos(3.1415927*47*x/10.00000000)
B Term = 0.00803873711547283850*sin(3.1415927*47*x/10.00000000)

N =   48
A Term = -0.01187033516838867900*cos(3.1415927*48*x/10.00000000)
B Term = 0.00186524040013030970*sin(3.1415927*48*x/10.00000000)

N =   49
A Term = 0.01110848179612070700*cos(3.1415927*49*x/10.00000000)
B Term = 0.01241246934037173100*sin(3.1415927*49*x/10.00000000)

N =   50
A Term = -0.00159117423189477580*cos(3.1415927*50*x/10.00000000)
B Term = 0.00260416208199160420*sin(3.1415927*50*x/10.00000000)

N =   51
A Term = 0.00989529039500905950*cos(3.1415927*51*x/10.00000000)
B Term = -0.00254331361455557930*sin(3.1415927*51*x/10.00000000)

N =   52
A Term = 0.00834195745433642490*cos(3.1415927*52*x/10.00000000)
B Term = 0.00100061304297829000*sin(3.1415927*52*x/10.00000000)

N =   53
A Term = -0.00709848487851465120*cos(3.1415927*53*x/10.00000000)
B Term = -0.01463862004224305100*sin(3.1415927*53*x/10.00000000)

N =   54
A Term = 0.00780453689952040340*cos(3.1415927*54*x/10.00000000)
B Term = 0.00093723523788297267*sin(3.1415927*54*x/10.00000000)

N =   55
A Term = -0.01552742091581945200*cos(3.1415927*55*x/10.00000000)
B Term = -0.00546954959031795660*sin(3.1415927*55*x/10.00000000)

N =   56
A Term = -0.00031068263743843705*cos(3.1415927*56*x/10.00000000)
B Term = 0.00045535291016017012*sin(3.1415927*56*x/10.00000000)

N =   57
A Term = -0.00171980053120679780*cos(3.1415927*57*x/10.00000000)
B Term = 0.01134967159167115000*sin(3.1415927*57*x/10.00000000)

N =   58
A Term = -0.00650118847783573860*cos(3.1415927*58*x/10.00000000)
B Term = -0.00282284986098885150*sin(3.1415927*58*x/10.00000000)

N =   59
A Term = 0.01476205547024808100*cos(3.1415927*59*x/10.00000000)
B Term = 0.01152390686665279900*sin(3.1415927*59*x/10.00000000)

N =   60
A Term = -0.00546928763965044780*cos(3.1415927*60*x/10.00000000)
B Term = -0.00449115806730165590*sin(3.1415927*60*x/10.00000000)

N =   61
A Term = 0.00998143469133775000*cos(3.1415927*61*x/10.00000000)
B Term = -0.00384198825224952960*sin(3.1415927*61*x/10.00000000)

N =   62

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A Term =    0.00047679155335931677*cos(3.1415927*62*x/10.00000000)
B Term =    0.00041315228612778701*sin(3.1415927*62*x/10.00000000)

N =    63
A Term =   -0.00830793700369917950*cos(3.1415927*63*x/10.00000000)
B Term =   -0.01216080976658390900*sin(3.1415927*63*x/10.00000000)

N =    64
A Term =    0.00531478250010750540*cos(3.1415927*64*x/10.00000000)
B Term =    0.00691916775064072180*sin(3.1415927*64*x/10.00000000)

N =    65
A Term =   -0.01327873704499691600*cos(3.1415927*65*x/10.00000000)
B Term =   -0.00358982664265015830*sin(3.1415927*65*x/10.00000000)

N =    66
A Term =    0.00470244489436939810*cos(3.1415927*66*x/10.00000000)
B Term =    0.00499158341120479330*sin(3.1415927*66*x/10.00000000)

N =    67
A Term =    0.00044186078444939566*cos(3.1415927*67*x/10.00000000)
B Term =    0.00754977211548748040*sin(3.1415927*67*x/10.00000000)

N =    68
A Term =   -0.00061916606725582958*cos(3.1415927*68*x/10.00000000)
B Term =   -0.00474470156635318360*sin(3.1415927*68*x/10.00000000)

N =    69
A Term =    0.01107194058225292700*cos(3.1415927*69*x/10.00000000)
B Term =    0.00682202118963723140*sin(3.1415927*69*x/10.00000000)

N =    70
A Term =   -0.00524047959257894010*cos(3.1415927*70*x/10.00000000)
B Term =   -0.00931792666515206080*sin(3.1415927*70*x/10.00000000)

N =    71
A Term =    0.00452833197511323060*cos(3.1415927*71*x/10.00000000)
B Term =   -0.00129668626795288990*sin(3.1415927*71*x/10.00000000)

N =    72
A Term =   -0.00414237595537471530*cos(3.1415927*72*x/10.00000000)
B Term =   -0.00136299709646369310*sin(3.1415927*72*x/10.00000000)

N =    73
A Term =   -0.00638004680540780500*cos(3.1415927*73*x/10.00000000)
B Term =   -0.00483632724329400870*sin(3.1415927*73*x/10.00000000)

N =    74
A Term =    0.00155576684012201500*cos(3.1415927*74*x/10.00000000)
B Term =    0.00903414933907483940*sin(3.1415927*74*x/10.00000000)

N =    75
A Term =   -0.00525803316638073350*cos(3.1415927*75*x/10.00000000)
B Term =   -0.00227114132641837710*sin(3.1415927*75*x/10.00000000)

N =    76
A Term =    0.00530363606356375540*cos(3.1415927*76*x/10.00000000)
B Term =    0.00760031213570345680*sin(3.1415927*76*x/10.00000000)

N =    77
A Term =    0.00294788000475155200*cos(3.1415927*77*x/10.00000000)
B Term =    0.00025259568186932000*sin(3.1415927*77*x/10.00000000)
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N =   78
A Term =   0.00280764231574142300*cos(3.1415927*78*x/10.00000000)
B Term =   -0.00390452186095862710*sin(3.1415927*78*x/10.00000000)

N =   79
A Term =   0.00369946527672188700*cos(3.1415927*79*x/10.00000000)
B Term =   0.00120461488497710730*sin(3.1415927*79*x/10.00000000)

N =   80
A Term =   -0.00262932464685880370*cos(3.1415927*80*x/10.00000000)
B Term =   -0.00995793363575586160*sin(3.1415927*80*x/10.00000000)

N =   81
A Term =   -0.00235225704843293250*cos(3.1415927*81*x/10.00000000)
B Term =   0.00280121879824070950*sin(3.1415927*81*x/10.00000000)

N =   82
A Term =   -0.00443582836621307310*cos(3.1415927*82*x/10.00000000)
B Term =   -0.00288959821728245350*sin(3.1415927*82*x/10.00000000)

N =   83
A Term =   -0.00290887390425370550*cos(3.1415927*83*x/10.00000000)
B Term =   0.00287886478308926360*sin(3.1415927*83*x/10.00000000)

N =   84
A Term =   -0.00109739835456087440*cos(3.1415927*84*x/10.00000000)
B Term =   0.00717063047961887660*sin(3.1415927*84*x/10.00000000)

N =   85
A Term =   0.00323820353726577990*cos(3.1415927*85*x/10.00000000)
B Term =   -0.00176020640344507190*sin(3.1415927*85*x/10.00000000)

N =   86
A Term =   0.00268203541840628200*cos(3.1415927*86*x/10.00000000)
B Term =   0.00718653169857251960*sin(3.1415927*86*x/10.00000000)

N =   87
A Term =   0.00434887683760564960*cos(3.1415927*87*x/10.00000000)
B Term =   -0.00626093030519325660*sin(3.1415927*87*x/10.00000000)

N =   88
A Term =   0.00276227379572644180*cos(3.1415927*88*x/10.00000000)
B Term =   -0.00146935962970417940*sin(3.1415927*88*x/10.00000000)

N =   89
A Term =   -0.00298820460291454070*cos(3.1415927*89*x/10.00000000)
B Term =   -0.00266707707982515550*sin(3.1415927*89*x/10.00000000)

N =   90
A Term =   0.00025423899620244172*cos(3.1415927*90*x/10.00000000)
B Term =   -0.00684243892835677620*sin(3.1415927*90*x/10.00000000)

N =   91
A Term =   -0.00685319685956094820*cos(3.1415927*91*x/10.00000000)
B Term =   0.00598253495912291770*sin(3.1415927*91*x/10.00000000)

N =   92
A Term =   -0.00148730332746402350*cos(3.1415927*92*x/10.00000000)
B Term =   -0.00326519497112327070*sin(3.1415927*92*x/10.00000000)

N =   93
A Term =   0.00021463015728170366*cos(3.1415927*93*x/10.00000000)
B Term =   0.00728853904814733870*sin(3.1415927*93*x/10.00000000)

N =   94
A Term =   -0.0015332881674725 0450*cos(3.1415927*94*x/10.00000000)
B Term =   0.0030274400521080 5630*sin(3.1415927*94*x/10.00000000)

N =   95
A Term =   0.0078905452188810 9960*cos(3.1415927*95*x/10.00000000)
B Term =   -0.0019082805713028 3600*sin(3.1415927*95*x/10.00000000)

N =   96
A Term =   -0.0009315162960449 0036*cos(3.1415927*96*x/10.00000000)
B Term =   0.0043737405217260 6520*sin(3.1415927*96*x/10.00000000)

N =   97
A Term =   0.0040121350075898 3420*cos(3.1415927*97*x/10.00000000)
B Term =   -0.0089352124251846 3540*sin(3.1415927*97*x/10.00000000)

N =   98
A Term =   0.0001445892001708 5305*cos(3.1415927*98*x/10.00000000)
B Term =   0.0009881289381503 9180*sin(3.1415927*98*x/10.00000000)

N =   99
A Term =   -0.0058893944303251 4100*cos(3.1415927*99*x/10.00000000)
B Term =   -0.0034371983360232 0820*sin(3.1415927*99*x/10.00000000)

N =   100
A Term =   0.0018319495270456 3850*cos(3.1415927*100*x/10.00000000)
B Term =   -0.0021090708375079 5560*sin(3.1415927*100*x/10.00000000)

Fourier Series of Coil #2 WaveForm

N =   0
A Term = -2.74361999999999990000*cos(3.1415927*0*x/10.00000000)
B Term =   0.00000000000000000000*sin(3.1415927*0*x/10.00000000)

N =   1
A Term = -1.15811931552203710000*cos(3.1415927*1*x/10.00000000)
B Term = -4.13845525093240150000*sin(3.1415927*1*x/10.00000000)

N =   2
A Term =   1.32342418551513720000*cos(3.1415927*2*x/10.00000000)
B Term = -1.25340345275166750000*sin(3.1415927*2*x/10.00000000)

N =   3
A Term =   0.43062339326826637000*cos(3.1415927*3*x/10.00000000)
B Term = -0.66035027064241847000*sin(3.1415927*3*x/10.00000000)

N =   4
A Term =   0.84711439711922676000*cos(3.1415927*4*x/10.00000000)
B Term = -0.28985906421062146000*sin(3.1415927*4*x/10.00000000)

N =   5
A Term =   0.30784754656924740000*cos(3.1415927*5*x/10.00000000)
B Term =   0.12045508076403209000*sin(3.1415927*5*x/10.00000000)

N =   6
A Term =   0.31598393736477626000*cos(3.1415927*6*x/10.00000000)
B Term = -0.03663733665335258700*sin(3.1415927*6*x/10.00000000)

N =   7
A Term =   0.16908025881034028000*cos(3.1415927*7*x/10.00000000)
B Term =   0.22205448731130051000*sin(3.1415927*7*x/10.00000000)

N =   8
A Term = -0.02500733130668391900*cos(3.1415927*8*x/10.00000000)
B Term =   0.02227928441091642200*sin(3.1415927*8*x/10.00000000)

N =   9
A Term =   0.09859030544601543600*cos(3.1415927*9*x/10.00000000)
B Term =   0.04376589727745757600*sin(3.1415927*9*x/10.00000000)

N =   10
A Term = -0.07858550079168165300*cos(3.1415927*10*x/10.00000000)
B Term =   0.05042126348264409900*sin(3.1415927*10*x/10.00000000)

N =   11
A Term =   0.03923496228642797000*cos(3.1415927*11*x/10.00000000)
B Term = -0.10986526678221016000*sin(3.1415927*11*x/10.00000000)

N =   12
A Term =   0.04169530091430402600*cos(3.1415927*12*x/10.00000000)
B Term =   0.05410387764194173700*sin(3.1415927*12*x/10.00000000)

N =   13
A Term = -0.02184716823760496400*cos(3.1415927*13*x/10.00000000)
B Term = -0.09358682604005536000*sin(3.1415927*13*x/10.00000000)

N =   14
A Term =   0.12973417978276905000*cos(3.1415927*14*x/10.00000000)
B Term =   0.00780322487170587770*sin(3.1415927*14*x/10.00000000)

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N =    15
A Term =   -0.03512903837810938500*cos(3.1415927*15*x/10.00000000)
B Term =    0.02377366768572087100*sin(3.1415927*15*x/10.00000000)

N =    16
A Term =    0.08461697643085192000*cos(3.1415927*16*x/10.00000000)
B Term =   -0.04802885001383761000*sin(3.1415927*16*x/10.00000000)

N =    17
A Term =    0.01346508119979164900*cos(3.1415927*17*x/10.00000000)
B Term =    0.08577663069815681700*sin(3.1415927*17*x/10.00000000)

N =    18
A Term =   -0.01924792143832004800*cos(3.1415927*18*x/10.00000000)
B Term =   -0.04664597881991877600*sin(3.1415927*18*x/10.00000000)

N =    19
A Term =    0.06062152266883882900*cos(3.1415927*19*x/10.00000000)
B Term =    0.03498715537731213900*sin(3.1415927*19*x/10.00000000)

N =    20
A Term =   -0.05564215108891779100*cos(3.1415927*20*x/10.00000000)
B Term =    0.00903635704816874680*sin(3.1415927*20*x/10.00000000)

N =    21
A Term =    0.04559523293367111900*cos(3.1415927*21*x/10.00000000)
B Term =   -0.04473185345555226500*sin(3.1415927*21*x/10.00000000)

N =    22
A Term =   -0.00207830510075500020*cos(3.1415927*22*x/10.00000000)
B Term =    0.04735349259883375000*sin(3.1415927*22*x/10.00000000)

N =    23
A Term =   -0.00958332265630864630*cos(3.1415927*23*x/10.00000000)
B Term =   -0.05474109917508092300*sin(3.1415927*23*x/10.00000000)

N =    24
A Term =    0.05571730548432476900*cos(3.1415927*24*x/10.00000000)
B Term =    0.02465410998371071700*sin(3.1415927*24*x/10.00000000)

N =    25
A Term =   -0.03524028832314136900*cos(3.1415927*25*x/10.00000000)
B Term =    0.00007207656450507609*sin(3.1415927*25*x/10.00000000)

N =    26
A Term =    0.04789741788620281700*cos(3.1415927*26*x/10.00000000)
B Term =   -0.02211360821528025900*sin(3.1415927*26*x/10.00000000)

N =    27
A Term =   -0.00808618491691309900*cos(3.1415927*27*x/10.00000000)
B Term =    0.04064425795521726300*sin(3.1415927*27*x/10.00000000)

N =    28
A Term =   -0.00129488993250056680*cos(3.1415927*28*x/10.00000000)
B Term =   -0.03361868854387191400*sin(3.1415927*28*x/10.00000000)

N =    29
A Term =    0.02783762211641897100*cos(3.1415927*29*x/10.00000000)
B Term =    0.02493656147269140300*sin(3.1415927*29*x/10.00000000)

N =    30
A Term =   -0.02621844534886263000*cos(3.1415927*30*x/10.00000000)
B Term =   -0.00515772548244608500*sin(3.1415927*30*x/10.00000000)
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N =   31
A Term =   0.02891337156763972000*cos(3.1415927*31*x/10.00000000)
B Term =   -0.01268678848227504200*sin(3.1415927*31*x/10.00000000)

N =   32
A Term =   -0.00830920443493120800*cos(3.1415927*32*x/10.00000000)
B Term =   0.02043594662800166100*sin(3.1415927*32*x/10.00000000)

N =   33
A Term =   0.00385996174731023050*cos(3.1415927*33*x/10.00000000)
B Term =   -0.02416761808845794800*sin(3.1415927*33*x/10.00000000)

N =   34
A Term =   0.01720029205073521700*cos(3.1415927*34*x/10.00000000)
B Term =   0.01665958564798683200*sin(3.1415927*34*x/10.00000000)

N =   35
A Term =   -0.01233775033100043000*cos(3.1415927*35*x/10.00000000)
B Term =   -0.00762781601253642930*sin(3.1415927*35*x/10.00000000)

N =   36
A Term =   0.02075354033223669700*cos(3.1415927*36*x/10.00000000)
B Term =   -0.00134898158507033630*sin(3.1415927*36*x/10.00000000)

N =   37
A Term =   -0.00790484178793027410*cos(3.1415927*37*x/10.00000000)
B Term =   0.00828933254464486740*sin(3.1415927*37*x/10.00000000)

N =   38
A Term =   0.00923848689191959090*cos(3.1415927*38*x/10.00000000)
B Term =   -0.01025909079018400500*sin(3.1415927*38*x/10.00000000)

N =   39
A Term =   0.00264053096314467890*cos(3.1415927*39*x/10.00000000)
B Term =   0.01005807152201909600*sin(3.1415927*39*x/10.00000000)

N =   40
A Term =   0.00028011886422642002*cos(3.1415927*40*x/10.00000000)
B Term =   -0.00799445845787278600*sin(3.1415927*40*x/10.00000000)

N =   41
A Term =   0.00814800814730738500*cos(3.1415927*41*x/10.00000000)
B Term =   0.00566753357585613770*sin(3.1415927*41*x/10.00000000)

N =   42
A Term =   -0.00351369993873072890*cos(3.1415927*42*x/10.00000000)
B Term =   -0.00305828484174879100*sin(3.1415927*42*x/10.00000000)

N =   43
A Term =   0.01011493619404944300*cos(3.1415927*43*x/10.00000000)
B Term =   0.00069723301150333844*sin(3.1415927*43*x/10.00000000)

N =   44
A Term =   -0.00518921397483862110*cos(3.1415927*44*x/10.00000000)
B Term =   0.00310564167662667630*sin(3.1415927*44*x/10.00000000)

N =   45
A Term =   0.00832740996511603490*cos(3.1415927*45*x/10.00000000)
B Term =   -0.00682123892233490750*sin(3.1415927*45*x/10.00000000)

N =   46
A Term =   -0.00032768809059656960*cos(3.1415927*46*x/10.00000000)

B Term =   0.00988727722111274430*sin(3.1415927*46*x/10.00000000)

N =   47
A Term =   -0.00097582794472149360*cos(3.1415927*47*x/10.00000000)
B Term =   -0.01159966053475196300*sin(3.1415927*47*x/10.00000000)

N =   48
A Term =   0.01158983616738575700*cos(3.1415927*48*x/10.00000000)
B Term =   0.00857826534050223390*sin(3.1415927*48*x/10.00000000)

N =   49
A Term =   -0.01110373118138918000*cos(3.1415927*49*x/10.00000000)
B Term =   -0.00346001676823489870*sin(3.1415927*49*x/10.00000000)

N =   50
A Term =   0.01655569436061189000*cos(3.1415927*50*x/10.00000000)
B Term =   -0.00464252736236808300*sin(3.1415927*50*x/10.00000000)

N =   51
A Term =   -0.00751168404419990700*cos(3.1415927*51*x/10.00000000)
B Term =   0.01222777075120149400*sin(3.1415927*51*x/10.00000000)

N =   52
A Term =   0.00378205799511278920*cos(3.1415927*52*x/10.00000000)
B Term =   -0.01547588193192155400*sin(3.1415927*52*x/10.00000000)

N =   53
A Term =   0.00926775425763013210*cos(3.1415927*53*x/10.00000000)
B Term =   0.01496482252288258200*sin(3.1415927*53*x/10.00000000)

N =   54
A Term =   -0.01340001816532341400*cos(3.1415927*54*x/10.00000000)
B Term =   -0.00763775351273100500*sin(3.1415927*54*x/10.00000000)

N =   55
A Term =   0.01830221973188598700*cos(3.1415927*55*x/10.00000000)
B Term =   -0.00196562842521091690*sin(3.1415927*55*x/10.00000000)

N =   56
A Term =   -0.01189718600162438300*cos(3.1415927*56*x/10.00000000)
B Term =   0.01131937258747469000*sin(3.1415927*56*x/10.00000000)

N =   57
A Term =   0.00586830870420980330*cos(3.1415927*57*x/10.00000000)
B Term =   -0.01773761656012484000*sin(3.1415927*57*x/10.00000000)

N =   58
A Term =   0.00783255050350688440*cos(3.1415927*58*x/10.00000000)
B Term =   0.01672097082854648300*sin(3.1415927*58*x/10.00000000)

N =   59
A Term =   -0.01300548059275832100*cos(3.1415927*59*x/10.00000000)
B Term =   -0.01102346700150321500*sin(3.1415927*59*x/10.00000000)

N =   60
A Term =   0.02001989560323314000*cos(3.1415927*60*x/10.00000000)
B Term =   0.00075102584276270283*sin(3.1415927*60*x/10.00000000)

N =   61
A Term =   -0.01370761922602530000*cos(3.1415927*61*x/10.00000000)
B Term =   0.00959766986324264890*sin(3.1415927*61*x/10.00000000)

N =   62

A Term =   0.00875217772440555450*cos(3.1415927*62*x/10.00000000)
B Term =   -0.01570073845665304400*sin(3.1415927*62*x/10.00000000)

N =   63
A Term =   0.00406007566968070830*cos(3.1415927*63*x/10.00000000)
B Term =   0.01712474329421512200*sin(3.1415927*63*x/10.00000000)

N =   64
A Term =   -0.01045890113075900700*cos(3.1415927*64*x/10.00000000)
B Term =   -0.01169095657029163600*sin(3.1415927*64*x/10.00000000)

N =   65
A Term =   0.01657614104308649200*cos(3.1415927*65*x/10.00000000)
B Term =   0.00312610880966039280*sin(3.1415927*65*x/10.00000000)

N =   66
A Term =   -0.01314054353460840700*cos(3.1415927*66*x/10.00000000)
B Term =   0.00592605293524422690*sin(3.1415927*66*x/10.00000000)

N =   67
A Term =   0.00903150642165032910*cos(3.1415927*67*x/10.00000000)
B Term =   -0.01272730332340424100*sin(3.1415927*67*x/10.00000000)

N =   68
A Term =   0.00154723980059945430*cos(3.1415927*68*x/10.00000000)
B Term =   0.01408033400703412100*sin(3.1415927*68*x/10.00000000)

N =   69
A Term =   -0.00660192133034991080*cos(3.1415927*69*x/10.00000000)
B Term =   -0.01130733450086722300*sin(3.1415927*69*x/10.00000000)

N =   70
A Term =   0.01323494767243209100*cos(3.1415927*70*x/10.00000000)
B Term =   0.00488025411003456620*sin(3.1415927*70*x/10.00000000)

N =   71
A Term =   -0.01086117802871475900*cos(3.1415927*71*x/10.00000000)
B Term =   0.00229653403162496030*sin(3.1415927*71*x/10.00000000)

N =   72
A Term =   0.00937328935657385200*cos(3.1415927*72*x/10.00000000)
B Term =   -0.00757446122364574540*sin(3.1415927*72*x/10.00000000)

N =   73
A Term =   -0.00183264048480829940*cos(3.1415927*73*x/10.00000000)
B Term =   0.01017542459615867500*sin(3.1415927*73*x/10.00000000)

N =   74
A Term =   -0.00182193996849948920*cos(3.1415927*74*x/10.00000000)
B Term =   -0.00911792243181569480*sin(3.1415927*74*x/10.00000000)

N =   75
A Term =   0.00730073558510019660*cos(3.1415927*75*x/10.00000000)
B Term =   0.00585174229159036390*sin(3.1415927*75*x/10.00000000)

N =   76
A Term =   -0.00695045763453506700*cos(3.1415927*76*x/10.00000000)
B Term =   -0.00158513372314571870*sin(3.1415927*76*x/10.00000000)

N =   77
A Term =   0.00777216245233860490*cos(3.1415927*77*x/10.00000000)
B Term =   -0.00240737547212706680*sin(3.1415927*77*x/10.00000000)

```
N =    78
A Term =  -0.00367980693096718080*cos(3.1415927*78*x/10.00000000)
B Term =   0.00502551597939557630*sin(3.1415927*78*x/10.00000000)

N =    79
A Term =   0.00239031393832929300*cos(3.1415927*79*x/10.00000000)
B Term =  -0.00621821150778771590*sin(3.1415927*79*x/10.00000000)

N =    80
A Term =   0.00215980368637591970*cos(3.1415927*80*x/10.00000000)
B Term =   0.00600002604147404410*sin(3.1415927*80*x/10.00000000)

N =    81
A Term =  -0.00297933191507433360*cos(3.1415927*81*x/10.00000000)
B Term =  -0.00472677784687316940*sin(3.1415927*81*x/10.00000000)

N =    82
A Term =   0.00619979051524979180*cos(3.1415927*82*x/10.00000000)
B Term =   0.00262558276476868810*sin(3.1415927*82*x/10.00000000)

N =    83
A Term =  -0.00540773386751254670*cos(3.1415927*83*x/10.00000000)
B Term =  -0.00004720366443422604*sin(3.1415927*83*x/10.00000000)

N =    84
A Term =   0.00647911453000702030*cos(3.1415927*84*x/10.00000000)
B Term =  -0.00286642983112907460*sin(3.1415927*84*x/10.00000000)

N =    85
A Term =  -0.00312095836221843370*cos(3.1415927*85*x/10.00000000)
B Term =   0.00539640498238052900*sin(3.1415927*85*x/10.00000000)

N =    86
A Term =   0.00156110297820006500*cos(3.1415927*86*x/10.00000000)
B Term =  -0.00688292614293857690*sin(3.1415927*86*x/10.00000000)

N =    87
A Term =   0.00362582333822096750*cos(3.1415927*87*x/10.00000000)
B Term =   0.00675761097804106200*sin(3.1415927*87*x/10.00000000)

N =    88
A Term =  -0.00563368694505811050*cos(3.1415927*88*x/10.00000000)
B Term =  -0.00435817347312019830*sin(3.1415927*88*x/10.00000000)

N =    89
A Term =   0.00867727448905274840*cos(3.1415927*89*x/10.00000000)
B Term =   0.00047053983625271748*sin(3.1415927*89*x/10.00000000)

N =    90
A Term =  -0.00684310309148810930*cos(3.1415927*90*x/10.00000000)
B Term =   0.00420312461844598360*sin(3.1415927*90*x/10.00000000)

N =    91
A Term =   0.00471027591097354910*cos(3.1415927*91*x/10.00000000)
B Term =  -0.00798498583283479070*sin(3.1415927*91*x/10.00000000)

N =    92
A Term =   0.00147686294893744340*cos(3.1415927*92*x/10.00000000)
B Term =   0.00925537900037681250*sin(3.1415927*92*x/10.00000000)

N =    93
A Term =  -0.00543605435333257250*cos(3.1415927*93*x/10.00000000)
B Term =  -0.00770577504671658350*sin(3.1415927*93*x/10.00000000)
```

A Term =   0.00875217772440555450*cos(3.1415927*62*x/10.00000000)
B Term = -0.01570073845665304400*sin(3.1415927*62*x/10.00000000)

N =   63
A Term =   0.00406007566968070830*cos(3.1415927*63*x/10.00000000)
B Term =   0.01712474329421512200*sin(3.1415927*63*x/10.00000000)

N =   64
A Term = -0.01045890113075900700*cos(3.1415927*64*x/10.00000000)
B Term = -0.01169095657029163600*sin(3.1415927*64*x/10.00000000)

N =   65
A Term =   0.01657614104308649200*cos(3.1415927*65*x/10.00000000)
B Term =   0.00312610880966039280*sin(3.1415927*65*x/10.00000000)

N =   66
A Term = -0.01314054353460840700*cos(3.1415927*66*x/10.00000000)
B Term =   0.00592605293524422690*sin(3.1415927*66*x/10.00000000)

N =   67
A Term =   0.00903150642165032910*cos(3.1415927*67*x/10.00000000)
B Term = -0.01272730332340424100*sin(3.1415927*67*x/10.00000000)

N =   68
A Term =   0.00154723980059945430*cos(3.1415927*68*x/10.00000000)
B Term =   0.01408033400703412100*sin(3.1415927*68*x/10.00000000)

N =   69
A Term = -0.00660192133034991080*cos(3.1415927*69*x/10.00000000)
B Term = -0.01130733450086722300*sin(3.1415927*69*x/10.00000000)

N =   70
A Term =   0.01323494767243209100*cos(3.1415927*70*x/10.00000000)
B Term =   0.00488025411003456620*sin(3.1415927*70*x/10.00000000)

N =   71
A Term = -0.01086117802871475900*cos(3.1415927*71*x/10.00000000)
B Term =   0.00229653403162496030*sin(3.1415927*71*x/10.00000000)

N =   72
A Term =   0.00937328935657385200*cos(3.1415927*72*x/10.00000000)
B Term = -0.00757446122364574540*sin(3.1415927*72*x/10.00000000)

N =   73
A Term = -0.00183264048480829940*cos(3.1415927*73*x/10.00000000)
B Term =   0.01017542459615867500*sin(3.1415927*73*x/10.00000000)

N =   74
A Term = -0.00182193996849948920*cos(3.1415927*74*x/10.00000000)
B Term = -0.00911792243181569480*sin(3.1415927*74*x/10.00000000)

N =   75
A Term =   0.00730073558510019660*cos(3.1415927*75*x/10.00000000)
B Term =   0.00585174229159036390*sin(3.1415927*75*x/10.00000000)

N =   76
A Term = -0.00695045763453506700*cos(3.1415927*76*x/10.00000000)
B Term = -0.00158513372314571870*sin(3.1415927*76*x/10.00000000)

N =   77
A Term =   0.00777216245233860490*cos(3.1415927*77*x/10.00000000)
B Term = -0.00240737547212706680*sin(3.1415927*77*x/10.00000000)

```
N =    78
A Term =  -0.00367980693096718080*cos(3.1415927*78*x/10.00000000)
B Term =   0.00502551597939557630*sin(3.1415927*78*x/10.00000000)

N =    79
A Term =   0.00239031393832929300*cos(3.1415927*79*x/10.00000000)
B Term =  -0.00621821150778771590*sin(3.1415927*79*x/10.00000000)

N =    80
A Term =   0.00215980368637591970*cos(3.1415927*80*x/10.00000000)
B Term =   0.00600002604147404410*sin(3.1415927*80*x/10.00000000)

N =    81
A Term =  -0.00297933191507433360*cos(3.1415927*81*x/10.00000000)
B Term =  -0.00472677784687316940*sin(3.1415927*81*x/10.00000000)

N =    82
A Term =   0.00619979051524979180*cos(3.1415927*82*x/10.00000000)
B Term =   0.00262558276476868810*sin(3.1415927*82*x/10.00000000)

N =    83
A Term =  -0.00540773386751254670*cos(3.1415927*83*x/10.00000000)
B Term =  -0.00004720366443422604*sin(3.1415927*83*x/10.00000000)

N =    84
A Term =   0.00647911453000702030*cos(3.1415927*84*x/10.00000000)
B Term =  -0.00286642983112907460*sin(3.1415927*84*x/10.00000000)

N =    85
A Term =  -0.00312095836221843370*cos(3.1415927*85*x/10.00000000)
B Term =   0.00539640498238052900*sin(3.1415927*85*x/10.00000000)

N =    86
A Term =   0.00156110297820006500*cos(3.1415927*86*x/10.00000000)
B Term =  -0.00688292614293857690*sin(3.1415927*86*x/10.00000000)

N =    87
A Term =   0.00362582333822096750*cos(3.1415927*87*x/10.00000000)
B Term =   0.00675761097804106200*sin(3.1415927*87*x/10.00000000)

N =    88
A Term =  -0.00563368694505811050*cos(3.1415927*88*x/10.00000000)
B Term =  -0.00435817347312019830*sin(3.1415927*88*x/10.00000000)

N =    89
A Term =   0.00867727448905274840*cos(3.1415927*89*x/10.00000000)
B Term =   0.00047053983625271748*sin(3.1415927*89*x/10.00000000)

N =    90
A Term =  -0.00684310309148810930*cos(3.1415927*90*x/10.00000000)
B Term =   0.00420312461844598360*sin(3.1415927*90*x/10.00000000)

N =    91
A Term =   0.00471027591097354910*cos(3.1415927*91*x/10.00000000)
B Term =  -0.00798498583283479070*sin(3.1415927*91*x/10.00000000)

N =    92
A Term =   0.00147686294893744340*cos(3.1415927*92*x/10.00000000)
B Term =   0.00925537900037681250*sin(3.1415927*92*x/10.00000000)

N =    93
A Term =  -0.00543605435333257250*cos(3.1415927*93*x/10.00000000)
B Term =  -0.00770577504671658350*sin(3.1415927*93*x/10.00000000)
```

```
N =   94
A Term =    0.01018870208156160900*cos(3.1415927*94*x/10.00000000)
B Term =    0.00311540145693248000*sin(3.1415927*94*x/10.00000000)

N =   95
A Term =   -0.00924508141264390390*cos(3.1415927*95*x/10.00000000)
B Term =    0.00264373533982534100*sin(3.1415927*95*x/10.00000000)

N =   96
A Term =    0.00751081839151258610*cos(3.1415927*96*x/10.00000000)
B Term =   -0.00772018440263961150*sin(3.1415927*96*x/10.00000000)

N =   97
A Term =   -0.00081043351747648196*cos(3.1415927*97*x/10.00000000)
B Term =    0.01040496000703253400*sin(3.1415927*97*x/10.00000000)

N =   98
A Term =   -0.00411922464695734220*cos(3.1415927*98*x/10.00000000)
B Term =   -0.00923823644255666360*sin(3.1415927*98*x/10.00000000)

N =   99
A Term =    0.00951601802805959910*cos(3.1415927*99*x/10.00000000)
B Term =    0.00508904349955530130*sin(3.1415927*99*x/10.00000000)

N =  100
A Term =   -0.00979379124793574620*cos(3.1415927*100*x/10.00000000)
B Term =    0.00096861240696119878*sin(3.1415927*100*x/10.00000000)
```

Fourier Series of Coil #3 WaveForm

```
N =      0
A Term =  -7.28779999999999360000*cos(3.1415927*0*x/10.00000000)
B Term =   0.00000000000000000000*sin(3.1415927*0*x/10.00000000)

N =      1
A Term =   4.40715604299113120000*cos(3.1415927*1*x/10.00000000)
B Term =   9.48810106687465190000*sin(3.1415927*1*x/10.00000000)

N =      2
A Term =   0.40064798325502660000*cos(3.1415927*2*x/10.00000000)
B Term =  -3.28761517848058430000*sin(3.1415927*2*x/10.00000000)

N =      3
A Term =   0.77450352575835657000*cos(3.1415927*3*x/10.00000000)
B Term =   3.00597579732173470000*sin(3.1415927*3*x/10.00000000)

N =      4
A Term =   0.32484976266351878000*cos(3.1415927*4*x/10.00000000)
B Term =  -1.80561445393920030000*sin(3.1415927*4*x/10.00000000)

N =      5
A Term =   0.39783212224486947000*cos(3.1415927*5*x/10.00000000)
B Term =   1.64962599323958160000*sin(3.1415927*5*x/10.00000000)

N =      6
A Term =   0.20531877078256025000*cos(3.1415927*6*x/10.00000000)
B Term =  -1.34707502388659780000*sin(3.1415927*6*x/10.00000000)

N =      7
A Term =   0.18186716825823435000*cos(3.1415927*7*x/10.00000000)
B Term =   1.08922973093976600000*sin(3.1415927*7*x/10.00000000)

N =      8
A Term =   0.08752115102527345500*cos(3.1415927*8*x/10.00000000)
B Term =  -1.06572834815167330000*sin(3.1415927*8*x/10.00000000)

N =      9
A Term =   0.03555203586400892300*cos(3.1415927*9*x/10.00000000)
B Term =   0.84112058592427630000*sin(3.1415927*9*x/10.00000000)

N =     10
A Term =   0.02534657041743482200*cos(3.1415927*10*x/10.00000000)
B Term =  -0.81923635123851324000*sin(3.1415927*10*x/10.00000000)

N =     11
A Term =  -0.01091289054795027900*cos(3.1415927*11*x/10.00000000)
B Term =   0.72346945839718757000*sin(3.1415927*11*x/10.00000000)

N =     12
A Term =   0.02636481902202903600*cos(3.1415927*12*x/10.00000000)
B Term =  -0.63392873932575311000*sin(3.1415927*12*x/10.00000000)

N =     13
A Term =   0.01330319972389277600*cos(3.1415927*13*x/10.00000000)
B Term =   0.63147432919845603000*sin(3.1415927*13*x/10.00000000)

N =     14
A Term =   0.04703532035650099400*cos(3.1415927*14*x/10.00000000)
B Term =  -0.54116281376694564000*sin(3.1415927*14*x/10.00000000)
```

Fourier Series of Coil #3 WaveForm

```
N =      0
A Term =   -7.28779999999999360000*cos(3.1415927*0*x/10.00000000)
B Term =    0.00000000000000000000*sin(3.1415927*0*x/10.00000000)


N =      1
A Term =    4.40715604299113120000*cos(3.1415927*1*x/10.00000000)
B Term =    9.48810106687465190000*sin(3.1415927*1*x/10.00000000)


N =      2
A Term =    0.40064798325502660000*cos(3.1415927*2*x/10.00000000)
B Term =   -3.28761517848058430000*sin(3.1415927*2*x/10.00000000)


N =      3
A Term =    0.77450352575835657000*cos(3.1415927*3*x/10.00000000)
B Term =    3.00597579732173470000*sin(3.1415927*3*x/10.00000000)


N =      4
A Term =    0.32484976266351878000*cos(3.1415927*4*x/10.00000000)
B Term =   -1.80561445393920030000*sin(3.1415927*4*x/10.00000000)


N =      5
A Term =    0.39783212224486947000*cos(3.1415927*5*x/10.00000000)
B Term =    1.64962599323958160000*sin(3.1415927*5*x/10.00000000)


N =      6
A Term =    0.20531877078256025000*cos(3.1415927*6*x/10.00000000)
B Term =   -1.34707502388659780000*sin(3.1415927*6*x/10.00000000)


N =      7
A Term =    0.18186716825823435000*cos(3.1415927*7*x/10.00000000)
B Term =    1.08922973093976600000*sin(3.1415927*7*x/10.00000000)


N =      8
A Term =    0.08752115102527345500*cos(3.1415927*8*x/10.00000000)
B Term =   -1.06572834815167330000*sin(3.1415927*8*x/10.00000000)


N =      9
A Term =    0.03555203586400892300*cos(3.1415927*9*x/10.00000000)
B Term =    0.84112058592427630000*sin(3.1415927*9*x/10.00000000)


N =     10
A Term =    0.02534657041743482200*cos(3.1415927*10*x/10.00000000)
B Term =   -0.81923635123851324000*sin(3.1415927*10*x/10.00000000)


N =     11
A Term =   -0.01091289054795027900*cos(3.1415927*11*x/10.00000000)
B Term =    0.72346945839718757000*sin(3.1415927*11*x/10.00000000)


N =     12
A Term =    0.02636481902202903600*cos(3.1415927*12*x/10.00000000)
B Term =   -0.63392873932575311000*sin(3.1415927*12*x/10.00000000)


N =     13
A Term =    0.01330319972389277600*cos(3.1415927*13*x/10.00000000)
B Term =    0.63147432919845603000*sin(3.1415927*13*x/10.00000000)


N =     14
A Term =    0.04703532035650099400*cos(3.1415927*14*x/10.00000000)
B Term =   -0.54116281376694564000*sin(3.1415927*14*x/10.00000000)
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```
N =    15
A Term =   0.03315260086104406700*cos(3.1415927*15*x/10.00000000)
B Term =   0.53645547242637026000*sin(3.1415927*15*x/10.00000000)

N =    16
A Term =   0.04764553358501690000*cos(3.1415927*16*x/10.00000000)
B Term =  -0.50472880968666611000*sin(3.1415927*16*x/10.00000000)

N =    17
A Term =   0.01253876304330971100*cos(3.1415927*17*x/10.00000000)
B Term =   0.46020092691204306000*sin(3.1415927*17*x/10.00000000)

N =    18
A Term =   0.03277522824397354600*cos(3.1415927*18*x/10.00000000)
B Term =  -0.46263615105982886000*sin(3.1415927*18*x/10.00000000)

N =    19
A Term =  -0.01848225989021693900*cos(3.1415927*19*x/10.00000000)
B Term =   0.41556045242696493000*sin(3.1415927*19*x/10.00000000)

N =    20
A Term =   0.02772433785500234800*cos(3.1415927*20*x/10.00000000)
B Term =  -0.39970362985068530000*sin(3.1415927*20*x/10.00000000)

N =    21
A Term =  -0.02245154894023093300*cos(3.1415927*21*x/10.00000000)
B Term =   0.38362520579149861000*sin(3.1415927*21*x/10.00000000)

N =    22
A Term =   0.03493578679148168900*cos(3.1415927*22*x/10.00000000)
B Term =  -0.34745272547386052000*sin(3.1415927*22*x/10.00000000)

N =    23
A Term =  -0.00693736131994262400*cos(3.1415927*23*x/10.00000000)
B Term =   0.34566490907174585000*sin(3.1415927*23*x/10.00000000)

N =    24
A Term =   0.03549393014968986500*cos(3.1415927*24*x/10.00000000)
B Term =  -0.32501707269493757000*sin(3.1415927*24*x/10.00000000)

N =    25
A Term =  -0.00286567885084546870*cos(3.1415927*25*x/10.00000000)
B Term =   0.30993451922964416000*sin(3.1415927*25*x/10.00000000)

N =    26
A Term =   0.02462208561631050100*cos(3.1415927*26*x/10.00000000)
B Term =  -0.31316689012176907000*sin(3.1415927*26*x/10.00000000)

N =    27
A Term =  -0.01559926452876011900*cos(3.1415927*27*x/10.00000000)
B Term =   0.29161036281315478000*sin(3.1415927*27*x/10.00000000)

N =    28
A Term =   0.01986687708992120000*cos(3.1415927*28*x/10.00000000)
B Term =  -0.28946182460697789000*sin(3.1415927*28*x/10.00000000)

N =    29
A Term =  -0.02406050516438000600*cos(3.1415927*29*x/10.00000000)
B Term =   0.28289878068399082000*sin(3.1415927*29*x/10.00000000)

N =    30
A Term =   0.03036884706583470000*cos(3.1415927*30*x/10.00000000)
B Term =  -0.26024659365835329000*sin(3.1415927*30*x/10.00000000)
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N =    31
A Term =   -0.01861038861489003000*cos(3.1415927*31*x/10.00000000)
B Term =    0.26351778956237620000*sin(3.1415927*31*x/10.00000000)

N =    32
A Term =    0.03979764826020104600*cos(3.1415927*32*x/10.00000000)
B Term =   -0.24302355529934427000*sin(3.1415927*32*x/10.00000000)

N =    33
A Term =   -0.01314889167406609700*cos(3.1415927*33*x/10.00000000)
B Term =    0.23359274865663179000*sin(3.1415927*33*x/10.00000000)

N =    34
A Term =    0.03178514108667273400*cos(3.1415927*34*x/10.00000000)
B Term =   -0.23594123689237462000*sin(3.1415927*34*x/10.00000000)

N =    35
A Term =   -0.01817635647281173900*cos(3.1415927*35*x/10.00000000)
B Term =    0.21436679739124920000*sin(3.1415927*35*x/10.00000000)

N =    36
A Term =    0.01683894791163258200*cos(3.1415927*36*x/10.00000000)
B Term =   -0.22404347849280248000*sin(3.1415927*36*x/10.00000000)

N =    37
A Term =   -0.02432656797033769600*cos(3.1415927*37*x/10.00000000)
B Term =    0.21455932244368531000*sin(3.1415927*37*x/10.00000000)

N =    38
A Term =    0.01701341263167277200*cos(3.1415927*38*x/10.00000000)
B Term =   -0.20588250499755475000*sin(3.1415927*38*x/10.00000000)

N =    39
A Term =   -0.02128695440828249800*cos(3.1415927*39*x/10.00000000)
B Term =    0.21564363262638464000*sin(3.1415927*39*x/10.00000000)

N =    40
A Term =    0.03196903389535456200*cos(3.1415927*40*x/10.00000000)
B Term =   -0.19386669082772631000*sin(3.1415927*40*x/10.00000000)

N =    41
A Term =   -0.01602882410045956500*cos(3.1415927*41*x/10.00000000)
B Term =    0.19946430930028430000*sin(3.1415927*41*x/10.00000000)

N =    42
A Term =    0.03936593535861420600*cos(3.1415927*42*x/10.00000000)
B Term =   -0.19077828096657160000*sin(3.1415927*42*x/10.00000000)

N =    43
A Term =   -0.01944122325976594900*cos(3.1415927*43*x/10.00000000)
B Term =    0.17526659214039758000*sin(3.1415927*43*x/10.00000000)

N =    44
A Term =    0.02858769507756694600*cos(3.1415927*44*x/10.00000000)
B Term =   -0.18468586642086063000*sin(3.1415927*44*x/10.00000000)

N =    45
A Term =   -0.02653671621534021300*cos(3.1415927*45*x/10.00000000)
B Term =    0.16495786139304283000*sin(3.1415927*45*x/10.00000000)

N =    46
A Term =    0.01582863836890429500*cos(3.1415927*46*x/10.00000000)
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B Term =   -0.17021777617144418000*sin(3.1415927*46*x/10.00000000)

N =   47
A Term =   -0.02507814195665177000*cos(3.1415927*47*x/10.00000000)
B Term =   0.17032042726322175000*sin(3.1415927*47*x/10.00000000)

N =   48
A Term =   0.01892457967576626600*cos(3.1415927*48*x/10.00000000)
B Term =   -0.15837348021016978000*sin(3.1415927*48*x/10.00000000)

N =   49
A Term =   -0.01731665576742365300*cos(3.1415927*49*x/10.00000000)
B Term =   0.17180061639874977000*sin(3.1415927*49*x/10.00000000)

N =   50
A Term =   0.03168666971098311300*cos(3.1415927*50*x/10.00000000)
B Term =   -0.15756088993692205000*sin(3.1415927*50*x/10.00000000)

N =   51
A Term =   -0.01689606063328836700*cos(3.1415927*51*x/10.00000000)
B Term =   0.15826736268999339000*sin(3.1415927*51*x/10.00000000)

N =   52
A Term =   0.03523298321666368200*cos(3.1415927*52*x/10.00000000)
B Term =   -0.15840714248111584000*sin(3.1415927*52*x/10.00000000)

N =   53
A Term =   -0.02564433517396170300*cos(3.1415927*53*x/10.00000000)
B Term =   0.14159985639404982000*sin(3.1415927*53*x/10.00000000)

N =   54
A Term =   0.02610452458390985200*cos(3.1415927*54*x/10.00000000)
B Term =   -0.14883089350222131000*sin(3.1415927*54*x/10.00000000)

N =   55
A Term =   -0.02968481085162888100*cos(3.1415927*55*x/10.00000000)
B Term =   0.13679117789105730000*sin(3.1415927*55*x/10.00000000)

N =   56
A Term =   0.01874072113117799000*cos(3.1415927*56*x/10.00000000)
B Term =   -0.13451847846681267000*sin(3.1415927*56*x/10.00000000)

N =   57
A Term =   -0.02220960163398961000*cos(3.1415927*57*x/10.00000000)
B Term =   0.14059500669783626000*sin(3.1415927*57*x/10.00000000)

N =   58
A Term =   0.02241508354580401500*cos(3.1415927*58*x/10.00000000)
B Term =   -0.13014309409883673000*sin(3.1415927*58*x/10.00000000)

N =   59
A Term =   -0.01526855385520465400*cos(3.1415927*59*x/10.00000000)
B Term =   0.13934107854961181000*sin(3.1415927*59*x/10.00000000)

N =   60
A Term =   0.02954065693639712200*cos(3.1415927*60*x/10.00000000)
B Term =   -0.13517023525401087000*sin(3.1415927*60*x/10.00000000)

N =   61
A Term =   -0.02049410402033369200*cos(3.1415927*61*x/10.00000000)
B Term =   0.12981081875725270000*sin(3.1415927*61*x/10.00000000)

N =   62

A Term = 0.02985287719262436800*cos(3.1415927*62*x/10.00000000)
B Term = -0.13416070163878444000*sin(3.1415927*62*x/10.00000000)

N = 63
A Term = -0.02998469094031682900*cos(3.1415927*63*x/10.00000000)
B Term = 0.12106134987919698000*sin(3.1415927*63*x/10.00000000)

N = 64
A Term = 0.02508532871450993100*cos(3.1415927*64*x/10.00000000)
B Term = -0.12158606129414624000*sin(3.1415927*64*x/10.00000000)

N = 65
A Term = -0.02877478945390350000*cos(3.1415927*65*x/10.00000000)
B Term = 0.11869366220116620000*sin(3.1415927*65*x/10.00000000)

N = 66
A Term = 0.02313216990965811700*cos(3.1415927*66*x/10.00000000)
B Term = -0.11088446870413478000*sin(3.1415927*66*x/10.00000000)

N = 67
A Term = -0.01889701778896906200*cos(3.1415927*67*x/10.00000000)
B Term = 0.11819920798825204000*sin(3.1415927*67*x/10.00000000)

N = 68
A Term = 0.02515445061853360500*cos(3.1415927*68*x/10.00000000)
B Term = -0.11294455287851746000*sin(3.1415927*68*x/10.00000000)

N = 69
A Term = -0.01614811779447110000*cos(3.1415927*69*x/10.00000000)
B Term = 0.11468592350343210000*sin(3.1415927*69*x/10.00000000)

N = 70
A Term = 0.02637699103210623000*cos(3.1415927*70*x/10.00000000)
B Term = -0.11872137102811642000*sin(3.1415927*70*x/10.00000000)

N = 71
A Term = -0.02488044892808013700*cos(3.1415927*71*x/10.00000000)
B Term = 0.11006755700208100000*sin(3.1415927*71*x/10.00000000)

N = 72
A Term = 0.02554426551445442000*cos(3.1415927*72*x/10.00000000)
B Term = -0.11378307790927356000*sin(3.1415927*72*x/10.00000000)

N = 73
A Term = -0.03132886187627011800*cos(3.1415927*73*x/10.00000000)
B Term = 0.10734375040054522000*sin(3.1415927*73*x/10.00000000)

N = 74
A Term = 0.02564479365057211300*cos(3.1415927*74*x/10.00000000)
B Term = -0.10111760445300262000*sin(3.1415927*74*x/10.00000000)

N = 75
A Term = -0.02569017606163896000*cos(3.1415927*75*x/10.00000000)
B Term = 0.10478722481254854000*sin(3.1415927*75*x/10.00000000)

N = 76
A Term = 0.02682840404423353400*cos(3.1415927*76*x/10.00000000)
B Term = -0.09590217657033799100*sin(3.1415927*76*x/10.00000000)

N = 77
A Term = -0.01729471778039086800*cos(3.1415927*77*x/10.00000000)
B Term = 0.10037251087629728000*sin(3.1415927*77*x/10.00000000)

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N =    78
A Term =    0.02596773565153813500*cos(3.1415927*78*x/10.00000000)
B Term =   -0.10136390731208866000*sin(3.1415927*78*x/10.00000000)

N =    79
A Term =   -0.01927676217266644600*cos(3.1415927*79*x/10.00000000)
B Term =    0.09674972831371569900*sin(3.1415927*79*x/10.00000000)

N =    80
A Term =    0.02345057400101445100*cos(3.1415927*80*x/10.00000000)
B Term =   -0.10432649278214973000*sin(3.1415927*80*x/10.00000000)

N =    81
A Term =   -0.02805288764499059400*cos(3.1415927*81*x/10.00000000)
B Term =    0.09655183639764985900*sin(3.1415927*81*x/10.00000000)

N =    82
A Term =    0.02366406369962355300*cos(3.1415927*82*x/10.00000000)
B Term =   -0.09646619154288227400*sin(3.1415927*82*x/10.00000000)

N =    83
A Term =   -0.02986045804636907100*cos(3.1415927*83*x/10.00000000)
B Term =    0.09654888694749914900*sin(3.1415927*83*x/10.00000000)

N =    84
A Term =    0.02714215572224735300*cos(3.1415927*84*x/10.00000000)
B Term =   -0.08678827765174096400*sin(3.1415927*84*x/10.00000000)

N =    85
A Term =   -0.02260418071865823200*cos(3.1415927*85*x/10.00000000)
B Term =    0.09232260580069852300*sin(3.1415927*85*x/10.00000000)

N =    86
A Term =    0.02846258372300060300*cos(3.1415927*86*x/10.00000000)
B Term =   -0.08652436790794175400*sin(3.1415927*86*x/10.00000000)

N =    87
A Term =   -0.01815197280754313200*cos(3.1415927*87*x/10.00000000)
B Term =    0.08629715498591289400*sin(3.1415927*87*x/10.00000000)

N =    88
A Term =    0.02494542714246842200*cos(3.1415927*88*x/10.00000000)
B Term =   -0.09176173262592352000*sin(3.1415927*88*x/10.00000000)

N =    89
A Term =   -0.02299306047023928400*cos(3.1415927*89*x/10.00000000)
B Term =    0.08463883383520680300*sin(3.1415927*89*x/10.00000000)

N =    90
A Term =    0.02183268427359664300*cos(3.1415927*90*x/10.00000000)
B Term =   -0.09079144193510409200*sin(3.1415927*90*x/10.00000000)

N =    91
A Term =   -0.02886934404226929700*cos(3.1415927*91*x/10.00000000)
B Term =    0.08704235678518203200*sin(3.1415927*91*x/10.00000000)

N =    92
A Term =    0.02425112497408456200*cos(3.1415927*92*x/10.00000000)
B Term =   -0.08271268263635517300*sin(3.1415927*92*x/10.00000000)

N =    93
A Term =   -0.02690069944200416300*cos(3.1415927*93*x/10.00000000)
B Term =    0.08655412262207529100*sin(3.1415927*93*x/10.00000000)
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N =    94
A Term =    0.02856105970443219300*cos(3.1415927*94*x/10.00000000)
B Term =   -0.07759640326448347100*sin(3.1415927*94*x/10.00000000)

N =    95
A Term =   -0.02115368829517351400*cos(3.1415927*95*x/10.00000000)
B Term =    0.08067735808281140100*sin(3.1415927*95*x/10.00000000)

N =    96
A Term =    0.02782388973497394000*cos(3.1415927*96*x/10.00000000)
B Term =   -0.07985090460762139800*sin(3.1415927*96*x/10.00000000)

N =    97
A Term =   -0.02083767080448749300*cos(3.1415927*97*x/10.00000000)
B Term =    0.07575058316382737900*sin(3.1415927*97*x/10.00000000)

N =    98
A Term =    0.02308497371616000100*cos(3.1415927*98*x/10.00000000)
B Term =   -0.08225049738435669100*sin(3.1415927*98*x/10.00000000)

N =    99
A Term =   -0.02559749606225375200*cos(3.1415927*99*x/10.00000000)
B Term =    0.07687992528559334200*sin(3.1415927*99*x/10.00000000)

N =   100
A Term =    0.02193505074687203800*cos(3.1415927*100*x/10.00000000)
B Term =   -0.07856685406744359800*sin(3.1415927*100*x/10.00000000)
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Fourier Series of Coil #4 WaveForm

N =   0
A Term =   0.56617249999999986000*cos(3.1415927*0*x/10.00000000)
B Term =   0.00000000000000000000*sin(3.1415927*0*x/10.00000000)

N =   1
A Term =   1.09249254712821610000*cos(3.1415927*1*x/10.00000000)
B Term =   -2.31789864232462420000*sin(3.1415927*1*x/10.00000000)

N =   2
A Term =   0.00981179087095048790*cos(3.1415927*2*x/10.00000000)
B Term =   -0.04112489142801858300*sin(3.1415927*2*x/10.00000000)

N =   3
A Term =   -0.77748985612891275000*cos(3.1415927*3*x/10.00000000)
B Term =   -0.31261244856835335000*sin(3.1415927*3*x/10.00000000)

N =   4
A Term =   -0.21395885460663036000*cos(3.1415927*4*x/10.00000000)
B Term =   -0.49731561287915355000*sin(3.1415927*4*x/10.00000000)

N =   5
A Term =   -0.06326466246765757900*cos(3.1415927*5*x/10.00000000)
B Term =   -0.01474582744236930400*sin(3.1415927*5*x/10.00000000)

N =   6
A Term =   -0.14793156423871748000*cos(3.1415927*6*x/10.00000000)
B Term =   0.14046831528945039000*sin(3.1415927*6*x/10.00000000)

N =   7
A Term =   -0.24797168551359183000*cos(3.1415927*7*x/10.00000000)
B Term =   0.10920604048146498000*sin(3.1415927*7*x/10.00000000)

N =   8
A Term =   -0.10529937270414663000*cos(3.1415927*8*x/10.00000000)
B Term =   -0.09912804285685128400*sin(3.1415927*8*x/10.00000000)

N =   9
A Term =   0.17167131777537348000*cos(3.1415927*9*x/10.00000000)
B Term =   0.04169883644591979000*sin(3.1415927*9*x/10.00000000)

N =   10
A Term =   -0.03604389302164717100*cos(3.1415927*10*x/10.00000000)
B Term =   0.16030589009013940000*sin(3.1415927*10*x/10.00000000)

N =   11
A Term =   -0.05687946556362513700*cos(3.1415927*11*x/10.00000000)
B Term =   -0.04157379940630168100*sin(3.1415927*11*x/10.00000000)

N =   12
A Term =   0.00746347100707194300*cos(3.1415927*12*x/10.00000000)
B Term =   -0.07741448217908968000*sin(3.1415927*12*x/10.00000000)

N =   13
A Term =   0.04677965051303101900*cos(3.1415927*13*x/10.00000000)
B Term =   -0.05168827145398219300*sin(3.1415927*13*x/10.00000000)

N =   14
A Term =   0.01881935686424155600*cos(3.1415927*14*x/10.00000000)
B Term =   0.06393327808509162400*sin(3.1415927*14*x/10.00000000)

```
N =    15
A Term =  -0.14926251694484238000*cos(3.1415927*15*x/10.00000000)
B Term =   0.00430833019779906530*sin(3.1415927*15*x/10.00000000)

N =    16
A Term =   0.00400934689146752090*cos(3.1415927*16*x/10.00000000)
B Term =  -0.09107947879529254600*sin(3.1415927*16*x/10.00000000)

N =    17
A Term =   0.04107199162903536100*cos(3.1415927*17*x/10.00000000)
B Term =   0.04480550109050864700*sin(3.1415927*17*x/10.00000000)

N =    18
A Term =  -0.02513483010903990200*cos(3.1415927*18*x/10.00000000)
B Term =   0.05328141397033510400*sin(3.1415927*18*x/10.00000000)

N =    19
A Term =  -0.02319750824937588300*cos(3.1415927*19*x/10.00000000)
B Term =   0.01486304287795250400*sin(3.1415927*19*x/10.00000000)

N =    20
A Term =  -0.02981677853568691700*cos(3.1415927*20*x/10.00000000)
B Term =  -0.04877271975207420100*sin(3.1415927*20*x/10.00000000)

N =    21
A Term =   0.08234647111292993400*cos(3.1415927*21*x/10.00000000)
B Term =  -0.02280237125775157500*sin(3.1415927*21*x/10.00000000)

N =    22
A Term =  -0.01755909709160662800*cos(3.1415927*22*x/10.00000000)
B Term =   0.06396359476175053600*sin(3.1415927*22*x/10.00000000)

N =    23
A Term =  -0.06736754162658392700*cos(3.1415927*23*x/10.00000000)
B Term =  -0.02724784418945111100*sin(3.1415927*23*x/10.00000000)

N =    24
A Term =   0.01342347891048435700*cos(3.1415927*24*x/10.00000000)
B Term =  -0.03836727371815250300*sin(3.1415927*24*x/10.00000000)

N =    25
A Term =   0.00649006668336018790*cos(3.1415927*25*x/10.00000000)
B Term =   0.01044439965961951000*sin(3.1415927*25*x/10.00000000)

N =    26
A Term =   0.01623500452876516400*cos(3.1415927*26*x/10.00000000)
B Term =   0.03832471896222652800*sin(3.1415927*26*x/10.00000000)

N =    27
A Term =  -0.05164227255180037200*cos(3.1415927*27*x/10.00000000)
B Term =   0.01833808584766311000*sin(3.1415927*27*x/10.00000000)

N =    28
A Term =   0.00453933015923544110*cos(3.1415927*28*x/10.00000000)
B Term =  -0.05186192618569127100*sin(3.1415927*28*x/10.00000000)

N =    29
A Term =   0.05528616183023992600*cos(3.1415927*29*x/10.00000000)
B Term =   0.00540162460879087780*sin(3.1415927*29*x/10.00000000)

N =    30
A Term =  -0.02322276098659497400*cos(3.1415927*30*x/10.00000000)
B Term =   0.03022148830030148600*sin(3.1415927*30*x/10.00000000)
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N =   31
A Term =   -0.02443069062556931700*cos(3.1415927*31*x/10.00000000)
B Term =   -0.01644699884497586800*sin(3.1415927*31*x/10.00000000)

N =   32
A Term =   -0.01821613913237197400*cos(3.1415927*32*x/10.00000000)
B Term =   -0.02863727439156048600*sin(3.1415927*32*x/10.00000000)

N =   33
A Term =   0.02587845850361290100*cos(3.1415927*33*x/10.00000000)
B Term =   -0.00182897415157960690*sin(3.1415927*33*x/10.00000000)

N =   34
A Term =   -0.00380630386689837390*cos(3.1415927*34*x/10.00000000)
B Term =   0.04401568361827439000*sin(3.1415927*34*x/10.00000000)

N =   35
A Term =   -0.04296442464423103100*cos(3.1415927*35*x/10.00000000)
B Term =   0.00518168838519577830*sin(3.1415927*35*x/10.00000000)

N =   36
A Term =   0.01947501514769441700*cos(3.1415927*36*x/10.00000000)
B Term =   -0.02770166802794235200*sin(3.1415927*36*x/10.00000000)

N =   37
A Term =   0.02715232505063041100*cos(3.1415927*37*x/10.00000000)
B Term =   0.00664869595287078880*sin(3.1415927*37*x/10.00000000)

N =   38
A Term =   0.00772989692749737490*cos(3.1415927*38*x/10.00000000)
B Term =   0.02140801458595822600*sin(3.1415927*38*x/10.00000000)

N =   39
A Term =   -0.02910081959317530400*cos(3.1415927*39*x/10.00000000)
B Term =   -0.01078718172161334900*sin(3.1415927*39*x/10.00000000)

N =   40
A Term =   -0.00523878133819048740*cos(3.1415927*40*x/10.00000000)
B Term =   -0.03573126874614390000*sin(3.1415927*40*x/10.00000000)

N =   41
A Term =   0.02360476292719618900*cos(3.1415927*41*x/10.00000000)
B Term =   -0.00044265542481909019*sin(3.1415927*41*x/10.00000000)

N =   42
A Term =   -0.02080349760969470900*cos(3.1415927*42*x/10.00000000)
B Term =   0.02717379084896266000*sin(3.1415927*42*x/10.00000000)

N =   43
A Term =   -0.02483902897068750200*cos(3.1415927*43*x/10.00000000)
B Term =   0.00568638916591429100*sin(3.1415927*43*x/10.00000000)

N =   44
A Term =   -0.00414881756937270950*cos(3.1415927*44*x/10.00000000)
B Term =   -0.01870697070901052700*sin(3.1415927*44*x/10.00000000)

N =   45
A Term =   0.03171448566130897300*cos(3.1415927*45*x/10.00000000)
B Term =   0.01053882640254597000*sin(3.1415927*45*x/10.00000000)

N =   46
A Term =   0.00468919299202278940*cos(3.1415927*46*x/10.00000000)

B Term =   0.02752936935293270500*sin(3.1415927*46*x/10.00000000)

N =   47
A Term =   -0.02272593657108745400*cos(3.1415927*47*x/10.00000000)
B Term =   -0.01112248324420425500*sin(3.1415927*47*x/10.00000000)

N =   48
A Term =   0.01397743790271679200*cos(3.1415927*48*x/10.00000000)
B Term =   -0.02470350495208207800*sin(3.1415927*48*x/10.00000000)

N =   49
A Term =   0.01021185128754429500*cos(3.1415927*49*x/10.00000000)
B Term =   -0.00899956149044097400*sin(3.1415927*49*x/10.00000000)

N =   50
A Term =   -0.00294503367668482550*cos(3.1415927*50*x/10.00000000)
B Term =   0.01949396818174421700*sin(3.1415927*50*x/10.00000000)

N =   51
A Term =   -0.03271457524882915400*cos(3.1415927*51*x/10.00000000)
B Term =   -0.00089064520998476050*sin(3.1415927*51*x/10.00000000)

N =   52
A Term =   -0.00604495086443738140*cos(3.1415927*52*x/10.00000000)
B Term =   -0.02244617615981126300*sin(3.1415927*52*x/10.00000000)

N =   53
A Term =   0.02708269626803621100*cos(3.1415927*53*x/10.00000000)
B Term =   0.01774578110907269400*sin(3.1415927*53*x/10.00000000)

N =   54
A Term =   -0.01182899689958353900*cos(3.1415927*54*x/10.00000000)
B Term =   0.01936693249441007200*sin(3.1415927*54*x/10.00000000)

N =   55
A Term =   -0.00515750086941284100*cos(3.1415927*55*x/10.00000000)
B Term =   0.00213869906170930690*sin(3.1415927*55*x/10.00000000)

N =   56
A Term =   0.00300092187372739010*cos(3.1415927*56*x/10.00000000)
B Term =   -0.02002084345616441500*sin(3.1415927*56*x/10.00000000)

N =   57
A Term =   0.02033055804109628800*cos(3.1415927*57*x/10.00000000)
B Term =   -0.00781400247078987630*sin(3.1415927*57*x/10.00000000)

N =   58
A Term =   0.00233154693600249850*cos(3.1415927*58*x/10.00000000)
B Term =   0.02200449020186051200*sin(3.1415927*58*x/10.00000000)

N =   59
A Term =   -0.03431615861781579800*cos(3.1415927*59*x/10.00000000)
B Term =   -0.01476626517866104500*sin(3.1415927*59*x/10.00000000)

N =   60
A Term =   0.00793568465276016030*cos(3.1415927*60*x/10.00000000)
B Term =   -0.01385648442370168500*sin(3.1415927*60*x/10.00000000)

N =   61
A Term =   0.00723145867476599620*cos(3.1415927*61*x/10.00000000)
B Term =   0.00710424121692789390*sin(3.1415927*61*x/10.00000000)

N =   62

A Term =   -0.0045602420652018768O*cos(3.1415927*62*x/10.00000000)
B Term =   0.01717558278867930800*sin(3.1415927*62*x/10.00000000)

N =   63
A Term =   -0.00974452387384814290*cos(3.1415927*63*x/10.00000000)
B Term =   0.00864698139981097060*sin(3.1415927*63*x/10.00000000)

N =   64
A Term =   -0.00245335710225589140*cos(3.1415927*64*x/10.00000000)
B Term =   -0.02417407162882102800*sin(3.1415927*64*x/10.00000000)

N =   65
A Term =   0.02970187298312643900*cos(3.1415927*65*x/10.00000000)
B Term =   0.00696823948358570640*sin(3.1415927*65*x/10.00000000)

N =   66
A Term =   -0.00857732452333697870*cos(3.1415927*66*x/10.00000000)
B Term =   0.01171639683764747300*sin(3.1415927*66*x/10.00000000)

N =   67
A Term =   -0.01736246711015310500*cos(3.1415927*67*x/10.00000000)
B Term =   -0.01083087685738750400*sin(3.1415927*67*x/10.00000000)

N =   68
A Term =   0.00342093869984540530*cos(3.1415927*68*x/10.00000000)
B Term =   -0.01129418504591160600*sin(3.1415927*68*x/10.00000000)

N =   69
A Term =   0.00420758510165385790*cos(3.1415927*69*x/10.00000000)
B Term =   -0.00337744789368669840*sin(3.1415927*69*x/10.00000000)

N =   70
A Term =   0.00124039556629589020*cos(3.1415927*70*x/10.00000000)
B Term =   0.02497602651608023200*sin(3.1415927*70*x/10.00000000)

N =   71
A Term =   -0.02052629372881104700*cos(3.1415927*71*x/10.00000000)
B Term =   -0.00214241763108399170*sin(3.1415927*71*x/10.00000000)

N =   72
A Term =   0.00702708696474984870*cos(3.1415927*72*x/10.00000000)
B Term =   -0.01390357489938043100*sin(3.1415927*72*x/10.00000000)

N =   73
A Term =   0.02090529260106091500*cos(3.1415927*73*x/10.00000000)
B Term =   0.00819013187553470700*sin(3.1415927*73*x/10.00000000)

N =   74
A Term =   -0.00539747728947537020*cos(3.1415927*74*x/10.00000000)
B Term =   0.00572335102581345190*sin(3.1415927*74*x/10.00000000)

N =   75
A Term =   -0.00974414609535226640*cos(3.1415927*75*x/10.00000000)
B Term =   -0.00113711028677424060*sin(3.1415927*75*x/10.00000000)

N =   76
A Term =   -0.00231795833719622860*cos(3.1415927*76*x/10.00000000)
B Term =   -0.02196368422837568000*sin(3.1415927*76*x/10.00000000)

N =   77
A Term =   0.01080788202668424300*cos(3.1415927*77*x/10.00000000)
B Term =   0.00317909796239368610*sin(3.1415927*77*x/10.00000000)

B Term =   0.02752936935293270500*sin(3.1415927*46*x/10.00000000)

N =   47
A Term =   -0.02272593657108745400*cos(3.1415927*47*x/10.00000000)
B Term =   -0.01112248324420425500*sin(3.1415927*47*x/10.00000000)

N =   48
A Term =   0.01397743790271679200*cos(3.1415927*48*x/10.00000000)
B Term =   -0.02470350495208207800*sin(3.1415927*48*x/10.00000000)

N =   49
A Term =   0.01021185128754429500*cos(3.1415927*49*x/10.00000000)
B Term =   -0.00899956149044097400*sin(3.1415927*49*x/10.00000000)

N =   50
A Term =   -0.00294503367668482550*cos(3.1415927*50*x/10.00000000)
B Term =   0.01949396818174421700*sin(3.1415927*50*x/10.00000000)

N =   51
A Term =   -0.03271457524882915400*cos(3.1415927*51*x/10.00000000)
B Term =   -0.00089064520998476050*sin(3.1415927*51*x/10.00000000)

N =   52
A Term =   -0.00604495086443738140*cos(3.1415927*52*x/10.00000000)
B Term =   -0.02244617615981126300*sin(3.1415927*52*x/10.00000000)

N =   53
A Term =   0.02708269626803621100*cos(3.1415927*53*x/10.00000000)
B Term =   0.01774578110907269400*sin(3.1415927*53*x/10.00000000)

N =   54
A Term =   -0.01182899689958353900*cos(3.1415927*54*x/10.00000000)
B Term =   0.01936693249441007200*sin(3.1415927*54*x/10.00000000)

N =   55
A Term =   -0.00515750086941284100*cos(3.1415927*55*x/10.00000000)
B Term =   0.00213869906170930690*sin(3.1415927*55*x/10.00000000)

N =   56
A Term =   0.00300092187372739010*cos(3.1415927*56*x/10.00000000)
B Term =   -0.02002084345616441500*sin(3.1415927*56*x/10.00000000)

N =   57
A Term =   0.02033055804109628800*cos(3.1415927*57*x/10.00000000)
B Term =   -0.00781400247078987630*sin(3.1415927*57*x/10.00000000)

N =   58
A Term =   0.00233154693600249850*cos(3.1415927*58*x/10.00000000)
B Term =   0.02200449020186051200*sin(3.1415927*58*x/10.00000000)

N =   59
A Term =   -0.03431615861781579800*cos(3.1415927*59*x/10.00000000)
B Term =   -0.01476626517866104500*sin(3.1415927*59*x/10.00000000)

N =   60
A Term =   0.00793568465276016030*cos(3.1415927*60*x/10.00000000)
B Term =   -0.01385648442370168500*sin(3.1415927*60*x/10.00000000)

N =   61
A Term =   0.00723145867476599620*cos(3.1415927*61*x/10.00000000)
B Term =   0.00710424121692789390*sin(3.1415927*61*x/10.00000000)

N =   62

A Term = -0.00456024206520187680*cos(3.1415927*62*x/10.00000000)
B Term =   0.01717558278867930800*sin(3.1415927*62*x/10.00000000)

N =   63
A Term = -0.00974452387384814290*cos(3.1415927*63*x/10.00000000)
B Term =   0.00864698139981097060*sin(3.1415927*63*x/10.00000000)

N =   64
A Term = -0.00245335710225589140*cos(3.1415927*64*x/10.00000000)
B Term = -0.02417407162882102800*sin(3.1415927*64*x/10.00000000)

N =   65
A Term =   0.02970187298312643900*cos(3.1415927*65*x/10.00000000)
B Term =   0.00696823948358570640*sin(3.1415927*65*x/10.00000000)

N =   66
A Term = -0.00857732452333697870*cos(3.1415927*66*x/10.00000000)
B Term =   0.01171639683764747300*sin(3.1415927*66*x/10.00000000)

N =   67
A Term = -0.01736246711015310500*cos(3.1415927*67*x/10.00000000)
B Term = -0.01083087685738750400*sin(3.1415927*67*x/10.00000000)

N =   68
A Term =   0.00342093869984540530*cos(3.1415927*68*x/10.00000000)
B Term = -0.01129418504591160600*sin(3.1415927*68*x/10.00000000)

N =   69
A Term =   0.00420758510165385790*cos(3.1415927*69*x/10.00000000)
B Term = -0.00337744789368669840*sin(3.1415927*69*x/10.00000000)

N =   70
A Term =   0.00124039556629589020*cos(3.1415927*70*x/10.00000000)
B Term =   0.02497602651608023200*sin(3.1415927*70*x/10.00000000)

N =   71
A Term = -0.02052629372881104700*cos(3.1415927*71*x/10.00000000)
B Term = -0.00214241763108399170*sin(3.1415927*71*x/10.00000000)

N =   72
A Term =   0.00702708696474984870*cos(3.1415927*72*x/10.00000000)
B Term = -0.01390357489938043100*sin(3.1415927*72*x/10.00000000)

N =   73
A Term =   0.02090529260106091500*cos(3.1415927*73*x/10.00000000)
B Term =   0.00819013187553470700*sin(3.1415927*73*x/10.00000000)

N =   74
A Term = -0.00539747728947537020*cos(3.1415927*74*x/10.00000000)
B Term =   0.00572335102581345190*sin(3.1415927*74*x/10.00000000)

N =   75
A Term = -0.00974414609535226640*cos(3.1415927*75*x/10.00000000)
B Term = -0.00113711028677424060*sin(3.1415927*75*x/10.00000000)

N =   76
A Term = -0.00231795833719622860*cos(3.1415927*76*x/10.00000000)
B Term = -0.02196368422837568000*sin(3.1415927*76*x/10.00000000)

N =   77
A Term =   0.01080788202668424300*cos(3.1415927*77*x/10.00000000)
B Term =   0.00317909796239368610*sin(3.1415927*77*x/10.00000000)

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N =    78
A Term =  -0.00665140754206137910*cos(3.1415927*78*x/10.00000000)
B Term =   0.01791275789818169400*sin(3.1415927*78*x/10.00000000)

N =    79
A Term =  -0.01793034566028110400*cos(3.1415927*79*x/10.00000000)
B Term =  -0.00461813302022995050*sin(3.1415927*79*x/10.00000000)

N =    80
A Term =   0.00564425421353095640*cos(3.1415927*80*x/10.00000000)
B Term =  -0.00367366629853589510*sin(3.1415927*80*x/10.00000000)

N =    81
A Term =   0.01541832536973611300*cos(3.1415927*81*x/10.00000000)
B Term =   0.00062323749650626179*sin(3.1415927*81*x/10.00000000)

N =    82
A Term =   0.00063109435374041913*cos(3.1415927*82*x/10.00000000)
B Term =   0.01618455773494796600*sin(3.1415927*82*x/10.00000000)

N =    83
A Term =  -0.01058925718458241500*cos(3.1415927*83*x/10.00000000)
B Term =  -0.00628860531959835220*sin(3.1415927*83*x/10.00000000)

N =    84
A Term =   0.00414014139447912640*cos(3.1415927*84*x/10.00000000)
B Term =  -0.02011236363676289000*sin(3.1415927*84*x/10.00000000)

N =    85
A Term =   0.00917247192479116010*cos(3.1415927*85*x/10.00000000)
B Term =   0.00518839745243783110*sin(3.1415927*85*x/10.00000000)

N =    86
A Term =  -0.00648514514502907330*cos(3.1415927*86*x/10.00000000)
B Term =   0.00543494720765342730*sin(3.1415927*86*x/10.00000000)

N =    87
A Term =  -0.01718658620480913200*cos(3.1415927*87*x/10.00000000)
B Term =   0.00280033832777892710*sin(3.1415927*87*x/10.00000000)

N =    88
A Term =   0.00034537575385590845*cos(3.1415927*88*x/10.00000000)
B Term =  -0.01089825880717670500*sin(3.1415927*88*x/10.00000000)

N =    89
A Term =   0.01487869741345353900*cos(3.1415927*89*x/10.00000000)
B Term =   0.00608046246394765980*sin(3.1415927*89*x/10.00000000)

N =    90
A Term =  -0.00397363565827067460*cos(3.1415927*90*x/10.00000000)
B Term =   0.01888951788189512100*sin(3.1415927*90*x/10.00000000)

N =    91
A Term =  -0.00533687574762478110*cos(3.1415927*91*x/10.00000000)
B Term =  -0.00939670010485410550*sin(3.1415927*91*x/10.00000000)

N =    92
A Term =   0.00463043960242224850*cos(3.1415927*92*x/10.00000000)
B Term =  -0.00846707235118616610*sin(3.1415927*92*x/10.00000000)

N =    93
A Term =   0.01110792542036384900*cos(3.1415927*93*x/10.00000000)
B Term =  -0.00380977408383048000*sin(3.1415927*93*x/10.00000000)
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N =   94
A Term =   -0.00223643740332019970*cos(3.1415927*94*x/10.00000000)
B Term =   0.00850239032674614430*sin(3.1415927*94*x/10.00000000)

N =   95
A Term =   -0.01959834873562553100*cos(3.1415927*95*x/10.00000000)
B Term =   -0.00153388924815955850*sin(3.1415927*95*x/10.00000000)

N =   96
A Term =   0.00405783610294633500*cos(3.1415927*96*x/10.00000000)
B Term =   -0.01564924352197519200*sin(3.1415927*96*x/10.00000000)

N =   97
A Term =   0.00682507666740661200*cos(3.1415927*97*x/10.00000000)
B Term =   0.01234043629945079700*sin(3.1415927*97*x/10.00000000)

N =   98
A Term =   -0.00384982513461736010*cos(3.1415927*98*x/10.00000000)
B Term =   0.00997995506244908970*sin(3.1415927*98*x/10.00000000)

N =   99
A Term =   -0.00523352515940012430*cos(3.1415927*99*x/10.00000000)
B Term =   -0.00003279889598913925*sin(3.1415927*99*x/10.00000000)

N =   100
A Term =   0.00139261122710255050*cos(3.1415927*100*x/10.00000000)
B Term =   -0.00866282147007208480*sin(3.1415927*100*x/10.00000000)